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AMERICAN STATISTICAL ASSOCIATION

MARCH, 1934
Supplement

PAPERS AND PROCEEDINGS

OF THE

NINETY-FIFTH ANNUAL MEETING

OF THE

AMERICAN STATISTICAL ASSOCIATION

Edited by
FRANK ALEXANDER ROSS

Held at Philadelphia, Pennsylvania
December 27–29
Nineteen Hundred and Thirty-three

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PROCEEDINGS OF THE AMERICAN STATISTICAL JOURNAL

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CONTENTS

PROGRAM OF ANNUAL MEETING 1
THE INDUSTRIAL AND COMMERCIAL AREA VS. THE POLITICAL AREA AS THE UNIT FOR THE COLLECTION OF BUSINESS STATISTICS 14
SOME PROBLEMS IN THE CONSTRUCTION OF AN INDEX NUMBER OF RENTS. By Jacob Perlman 24
DISCUSSION. By Ewan Clague 29
OPERATING COST VARIABLES IN A LOW RENTAL HOUSING PROGRAM. By Asher Achinstein 33
CONSTRUCTION COST STATISTICS. By James S. Taylor 38
CHANGES IN FAMILY INCOME AND RENTAL DURING THE ECONOMIC DEPRESSION. By Edgar Sydenstricker and G. St. J. Perrott 43
THE ECONOMIC DEPRESSION AND SICKNESS. By Selwyn D. Collins and G. St. J. Perrott 47
PROBLEMS IN THE APPLICATION OF CORRELATION TO SOCIOLOGY. By Samuel A. Stouffer 52
THE INADEQUACY OF CORRELATION METHOD IN GENETIC RESEARCH. By Barkev Sanders 59
DISPERSION IN MAN-HOUR PRODUCTIVITY SINCE 1929. By Arthur F. Beal 66
FACTORS MAKING FOR INSTABILITY. By J. M. Clark 72
THE PROCESSES OF BUSINESS REVIVAL IN THE LIGHT OF 1933 CONDITIONS. By Lewis H. Haney 75
ESTIMATES OF UNEMPLOYMENT DURING THE LAST FOUR YEARS. By Theodore J. Kreps 81
THE RELIABILITY OF VARIOUS STATISTICAL SERIES AS CITY AND REGIONAL BUSINESS INDEXES 86
STATE AND FEDERAL COÖPERATION IN THE COLLECTION OF SOCIAL WELFARE STATISTICS. By Ralph G. Hurlin 94
JUDICIAL CRIMINAL STATISTICS. By Leon C. Marshall 99
THE 13-MONTH BUSINESS CALENDAR 100
THE REAL PROPERTY INVENTORY. By Howard Whipple Green 105
DENVER REAL PROPERTY STUDIES. By F. L. Carmichael 111
THE USE OF FAMILY EXPENDITURES IN COST-OF-LIVING INDEXES. By Helen R. Wright 118
REVISING THE WAGE EARNERS' COST-OF-LIVING INDEX. By Margaret H. Hogg 120
MEASURING CHANGES IN THE COST OF LIVING OF FEDERAL EMPLOYEES LIVING IN WASHINGTON. By Faith M. Williams 125
ADEQUACY OF THE SAMPLE IN BUDGETARY STUDIES. By Hugh S. Hanna 131
STATE AND FEDERAL COÖPERATION IN THE COLLECTION OF INDUSTRIAL STATISTICS. By Roswell F. Phelps 135

USING STATE BUREAUS FOR THE JOINT COLLECTION OF LABOR STATISTICS. By Howard B. Myers 140
STATISTICAL PROBLEMS OF THE MEAT PACKING INDUSTRY UNDER AN AGRICULTURAL ADJUSTMENT ADMINISTRATION TRADE AGREEMENT. By Charles F. Sarle 146
STATISTICAL PROBLEMS ARISING OUT OF THE NRA CODES: THE AUTOMOBILE INDUSTRY. By Lawrence H. Seltzer 152
STATISTICS AS A PUBLIC WORK. By Willard L. Thorp 157
STATISTICS AND ECONOMICS. By O. M. W. Sprague 162
SAMPLING ERRORS AND INTERPRETATIONS OF SOCIAL DATA ORDERED IN TIME AND SPACE. By Frederick F. Stephan 165
SOME PROBLEMS IN THE CORRELATION OF SPATIALLY DISTRIBUTED VARIABLES. By Jerry A. Neprash 167
CERTAIN EFFECTS OF GROUPING UPON THE SIZE OF THE CORRELATION COEFFICIENT IN CENSUS TRACT MATERIAL. By C. E. Gehlke and Katherine Biehl 169
THE TRADE INSTITUTES AND CODE AUTHORITIES. By Wilson Compton 171
THE CODE AUTHORITY IN COÖPERATION WITH NRA OR A GOVERNMENT BUREAU. By Roy A. Cheney 177
WHO SHOULD COLLECT ECONOMIC STATISTICS FOR RECOVERY AND PLANNING? By Isador Lubin 180
DISCUSSION. Morris A. Copeland 184
A STATISTICAL ANALYSIS OF THE FOOD REQUIREMENTS FOR THE POPULATION OF THE UNITED STATES. By Hazel K. Stiebeling 186
MINUTES OF THE ANNUAL BUSINESS MEETING 193
REPORTS OF
SECRETARY 198
TREASURER 199
AUDITING COMMITTEE 202
EDITOR OF THE JOURNAL 202
COMMITTEE ON FELLOWS 203
COMMITTEE ON SPECIAL PUBLICATIONS 203
COMMITTEE ON CHAPTER RELATIONSHIPS 204
NEW YORK CITY PROGRAM COMMITTEE 206
COMMITTEE TO STIMULATE AND COÖRDINATE RESEARCH 206
COMMITTEE ON GOVERNMENT STATISTICS AND INFORMATION SERVICES 207
ADVISORY COMMITTEE TO THE SECRETARY OF LABOR 208
COMMITTEE ON LABOR STATISTICS 210
COMMITTEE ON INCOME TAX STATISTICS 212
COMMITTEE ON REAL ESTATE AND CONSTRUCTION STATISTICS 213
COMMITTEE ON STATISTICS FOR MENTAL AND PHYSICAL DISORDERS 213
REPRESENTATIVE ON THE NATIONAL CONFERENCE ON NOMENCLATURE OF DISEASE 216
COMMITTEE ON STATISTICS OF RELIEF AND CHILD CARE 217
COMMITTEE ON CALENDAR REFORM
Majority Report 219
Minority Report 231
COMMITTEE ON CENSUS ENUMERATION AREAS 232
REPRESENTATIVES ON THE ADVISORY COMMITTEE ON THE CENSUS 233
REPRESENTATIVE ON THE BOARD OF DIRECTORS OF THE NATIONAL BUREAU OF ECONOMIC RESEARCH 235
REPRESENTATIVES ON THE JOINT COMMITTEE ON THE ENCYCLOPAEDIA OF THE SOCIAL SCIENCES 235
REPRESENTATIVES ON THE SOCIAL SCIENCE RESEARCH COUNCIL 236
REPRESENTATIVE ON THE BOARD OF THE BUSINESS RESEARCH COUNCIL 236
REPRESENTATIVES ON COMMITTEE APPOINTED TO ADVISE THE NEW YORK STATE DEPARTMENT OF SOCIAL WELFARE 237
REPRESENTATIVE ON THE JOINT COMMITTEE FOR THE DEVELOPMENT OF STATISTICAL APPLICATIONS IN ENGINEERING AND MANUFACTURING 237
COMMITTEES FOR 1934 238

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NINETY-FIFTH ANNUAL MEETING

OF THE AMERICAN STATISTICAL ASSOCIATION
HELD AT HOTEL BENJAMIN FRANKLIN, PHILADELPHIA, PENNSYLVANIA
WEDNESDAY, DECEMBER 27, THROUGH FRIDAY, DECEMBER 29, 1933

PROGRAM

WEDNESDAY, DECEMBER 27, 1933

10:00 *A. M.*—ROUND TABLE CONFERENCES

ROUND TABLE I (The Foyer, Benjamin Franklin Hotel)

CHAIRMAN:

J. Frederic Dewhurst, The Twentieth Century Fund

TOPIC:

The Industrial and Commercial Area vs. the Political Area as the Unit for the Collection of Business Statistics [1]

DISCUSSION:

James N. Holsen, Southwestern Bell Telephone Company
Alonzo B. Cox, University of Texas
Ralph J. Watkins, University of Pittsburgh
Waldo E. Grimes, Kansas State College of Agriculture and Applied Science
Paul T. Cherington, Marketing Counselor
Casimir A. Sienkiewicz, Federal Reserve Bank, Philadelphia
Clarence E. Batschelet, Geographer, the Bureau of the Census [2]
F. L. Carmichael, University of Denver

ROUND TABLE II (Room 252, Benjamin Franklin Hotel)

CHAIRMAN:

Frank R. Garfield, Division of Research and Statistics, Federal Reserve Board

TOPIC:

Construction and Urban Real Property Statistics

PAPERS:

Some Problems in the Construction of an Index Number of Rents
Jacob Perlman, University of North Dakota
Operating Cost Variables in a Low Rental Housing Program
Asher Achinstein, New York State Board of Housing
Construction Cost Statistics
James S. Taylor, Division of Building and Housing, Department of Commerce

DISCUSSION:

Edward T. Frankel, National Industrial Conference Board
Ewan Clague, Pennsylvania School of Social Work
Corwin D. Edwards, National Recovery Administration

[1] The papers of this session were summarized by Elma S. Moulton, of the Bureau of Foreign and Domestic Commerce.
[2] No manuscript submitted.

10:00 *A. M.*—SECTION I (Betsy Ross A., Benjamin Franklin Hotel)

CHAIRMAN:
Alvin Hansen, University of Minnesota

TOPIC:
The Business Cycle

PAPERS:
The Equation of Economic Balance
Malcolm C. Rorty [1]
A Quantitative Study of Economic Balance
R. N. Naess, Goldman Sachs Corporation [1]

DISCUSSION:
Oswald Knauth, R. H. Macy & Company
Milan Drake

10:00 *A. M.*—SECTION II (Room 202, Benjamin Franklin Hotel)

CHAIRMAN:
Halbert L. Dunn, Director, University Hospital, University of Minnesota

TOPIC:
Medical Statistics

PAPERS:
Changes in Family Income and Rental During the Economic Depression
Edgar Sydenstricker, Director, Research Division, The Milbank Memorial Fund
G. St. J. Perrott, U. S. Public Health Service
The Economic Depression and Sickness
Selwyn D. Collins, U. S. Public Health Service
G. St. J. Perrott, U. S. Public Health Service
Derivation of Rates from Summation Data by the Catalytic Curve
Hugo Muench, International Health Division, Rockefeller Foundation [2]
Limitations of the Application of Four-Fold Table Analysis to Hospital Data
Joseph Berkson, Consultant in Statistics, Mayo Clinic and Mayo Foundation [3]

10:00 *A. M.*—SECTION III (Room 210, Benjamin Franklin Hotel)

CHAIRMAN:
J. Parker Bursk, University of Pennsylvania

TOPIC:
Statistical Methodology

PAPERS:
Problems in the Application of Correlation to Sociology
Samuel A. Stouffer, University of Wisconsin
Inadequacy of Correlation Method in Genetic Research
Barkev Sanders, U. S. Public Health Service
Dispersion in Man-Hour Productivity Since 1929
Arthur F. Beal, U. S. Department of Labor

12:30 *P. M.*—LUNCHEON MEETINGS

ROUND TABLE I (Independence Room, Benjamin Franklin Hotel)
COMMITTEE ON CENSUS ENUMERATION AREAS [4]

CHAIRMAN:
Howard Whipple Green, Cleveland, Ohio

[1] To be printed in a future issue of the *Harvard Business Review*.
[2] Revision printed in the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION, March, 1934, p. 25.
[3] Probably to appear in the Proceedings of the Mayo Clinic Staff.
[4] See the Committee Report on p. 232.

ROUND TABLE II (Room 244, Benjamin Franklin Hotel)

COMMITTEE ON CHAPTER RELATIONSHIPS—COMPLIMENTARY LUNCHEON TO THE DISTRICT SECRETARIES AND OFFICERS OF THE ASSOCIATION

CHAIRMAN:

Stuart A. Rice, U. S. Bureau of the Census

TOPIC:

What Are the Statistical Problems of Your Community to Which Your Chapter Should Give Consideration? [1]

SPEAKERS:

Roswell F. Phelps, Massachusetts Department of Labor and Industries
David M. Schneider, New York State Department of Social Welfare

ROUND TABLE III (East End of Crystal Ball Room, Benjamin Franklin Hotel)

CHAIRMAN:

Alvin Hansen, University of Minnesota

TOPIC:

The Business Cycle—Continuation of Discussion of Morning Meeting

PAPERS:

Factors Making for Instability
J. M. Clark, Columbia University
Is There a Critical Point in Depression?
Lionel D. Edie, Capital Research Company [1]
The Processes of Business Revival in the Light of 1933 *Conditions*
Lewis H. Haney, New York University

DISCUSSION:

Ralph Souter, Columbia University
W. W. Cumberland, Wellington & Company
Irving Fisher, Yale University

2:30 *P. M.*—ROUND TABLE CONFERENCE (Foyer, Benjamin Franklin Hotel)

CHAIRMAN:

Eugene B. Patton, New York State Department of Labor

TOPIC:

Employment and Unemployment Statistics

PAPERS:

Employment and Payroll Indexes and the Problem of Measuring Current Employment
Aryness Joy, Division of Statistics, Federal Reserve Board [2]
Adjustment of Indexes of Employment and Payrolls for Conformity to Census of Manufactures
Sidney W. Wilcox, Chief Statistician, New York State Department of Labor [3]
Unemployment Estimates
J. Frederic Dewhurst, The Twentieth Century Fund [1]
Estimates of Unemployment During the Last Four Years
Theodore J. Kreps, Stanford University

DISCUSSION:

Meredith B. Givens, The Social Science Research Council
Margaret H. Hogg, Russell Sage Foundation
Emmett H. Welch, University of Pennsylvania

[1] No manuscript submitted.
[2] To constitute a part of the Report of the Advisory Committee to the Secretary of Labor on p. 208.
[3] To be published in a future bulletin of the Bureau of Labor Statistics.

8:00 *P. M.*—PRESIDENTIAL SESSION (Crystal Ball Room, Benjamin Franklin Hotel)
(Jointly Sponsored by the American Statistical Association, the American Economic Association, the American Sociological Society, and the American Political Science Association)

PRESIDING OFFICER:

Roland S. Morris, Former Ambassador to Japan

PRESIDENTIAL ADDRESSES:

American Statistical Association
Stuart A. Rice, President—*Statistical Opportunities and Responsibilities* [1]

American Political Science Association
Isidor Loeb, President—*Fact and Fiction in Government* [2]

American Economic Association
Abbott Payson Usher, Vice-President—*A Liberal Theory of Constructive Statecraft* [3]

THURSDAY, DECEMBER 28, 1933

9:00 *A. M.*—BUSINESS MEETING (Foyer, Benjamin Franklin Hotel)

10:00 *A. M.*—ROUND TABLE CONFERENCES

ROUND TABLE I (Room 252, Benjamin Franklin Hotel)

CHAIRMAN:

Willard L. Thorp, Director, Bureau of Foreign and Domestic Commerce

TOPIC:

The Reliability of Various Statistical Series as City and Regional Business Indexes [4]

SPEAKERS:

Department Store Sales
A. W. Zelomek, Economist, Fairchild Publications

Electric Power Consumption
William M. Carpenter, Economist, Edison Electric Company [5]

Bank Debits
Melville M. Drake, St. Louis Chamber of Commerce

Gas Consumption
Paul A. Ryan, Statistician, American Gas Association [5]

Street Railway and Bus Passengers
Edmund J. Murphy, American Transit Association

Life Insurance Sales
William A. Berridge and Corliss Parry, Metropolitan Life Insurance Company [5]

Car Loadings
Andrew Court, National Recovery Administration [5]

Employment and Payroll Data
William A. Berridge and Corliss Parry, Metropolitan Life Insurance Company [5]
Howard G. Brunsman, Ohio State University

Local Telephone Messages in Metropolitan Areas
Seymour L. Andrew, American Telephone & Telegraph Company

Construction Contracts and Building Permits
Howard G. Brunsman, Ohio State University

Regional Production Indexes
Aryness Joy, Statistician, Federal Reserve Board

Postal Receipts
F. L. Carmichael, University of Denver

[1] Printed in the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION, March, 1934, Vol. 29, p. 1.
[2] Printed in the February number of the *American Political Science Review*.
[3] To be published by the American Economic Association.
[4] The papers of this session were summarized by Elma S. Moulton, of the Bureau of Foreign and Domestic Commerce.
[5] No manuscript submitted.

ROUND TABLE II (Franklin Room, Benjamin Franklin Hotel)

(JOINT SESSION WITH AMERICAN ECONOMIC ASSOCIATION)

CHAIRMAN:
Meredith B. Givens, Social Science Research Council

TOPIC:
A Social Program as Protection Against Unemployment [1]

PAPERS:
The Permanent Problem of Unemployment
Ewan Clague, Pennsylvania School of Social Work
Research Program of the Federal Emergency Relief Administration
Corrington C. Gill, Federal Emergency Relief Administration
Planned Economic Security for Permanently Displaced Industrial Workers
J. Douglas Brown, Industrial Relations Section, Princeton University

DISCUSSION:
Bryce M. Stewart, Industrial Relations Counselors, Inc., New York
Alvin H. Hansen, University of Minnesota

ROUND TABLE III (Room 244, Benjamin Franklin Hotel)

CHAIRMAN:
G. E. Harmon, Chairman, Vital Statistics Section, American Public Health Association

TOPIC:
Federal Vital Statistics [2]

PAPERS:
What Should Federal Vital Statistics Become?
Lowell J. Reed, Johns Hopkins University
Where and How in the Federal Service Should the Division Be Organized So As to Function Best?
Walter F. Willcox, Cornell University

DISCUSSION:
Haven Emerson, President, American Public Health Association
Arthur W. Hedrich, Secretary, Vital Statistics Section, American Public Health Association
J. V. DePorte, Division of Vital Statistics, N. Y. Department of Health
George H. Van Buren, Metropolitan Life Insurance Company

ROUND TABLE IV (Room 341, Benjamin Franklin Hotel)

CHAIRMAN:
Horatio M. Pollock, Director, Mental Hygiene Statistics, New York State

TOPIC:
State and Federal Coöperation in the Collection of Social Welfare and Criminal Statistics

PAPERS:
Social Welfare Statistics
Ralph G. Hurlin, Russell Sage Foundation
Judicial Criminal Statistics
Leon C. Marshall, The Brookings Institution

DISCUSSION:
Neva R. Deardorff, Director of Research, Welfare Council, N. Y.
David M. Schneider, Director of Research, New York State Department of Social Welfare
C. E. Gehlke, Western Reserve University

[1] Abstracts to be published by the American Economic Association.
[2] Not printed here.

ROUND TABLE V (Room 441, Benjamin Franklin Hotel)

CHAIRMAN:
William J. Donald, Executive Vice-President, Packing Machinery Manufacturers Institute

TOPIC:
The 13-Month Business Calendar [1]

SPEAKERS:
Seth L. Bush, Port Huron Sulphite and Paper Company
W. B. Benjamin, Leo Wolff Company

DISCUSSION:
W. R. Breck, Linen Thread Company
A. H. Robinson, Eastman Kodak Company
E. B. Glover, Samuel M. Langston Company
John Thies, Quality Bakers of America
E. J. Pollock, Vice-President, Sears, Roebuck Company

ROUND TABLE VI (Room 541, Benjamin Franklin Hotel)

CHAIRMAN:
John R. Riggleman, National Recovery Administration

TOPIC:
Construction and Urban Real Property Statistics

PAPERS:
The Real Property Inventory
Howard Whipple Green, Director, Cleveland Real Property Inventory
Denver Real Property Studies
F. L. Carmichael, University of Denver
Forecasting the Volume of Construction
Victor S. von Szeliski, National Recovery Administration [2]

DISCUSSION:
Roy W. Wenzlick, Real Estate Analysts, Inc., St. Louis
Anton Friedrich, New York University

ROUND TABLE VII (Center Crystal Room, Broadwood Hotel)

(JOINT MEETING WITH AMERICAN FARM ECONOMIC ASSOCIATION)

CHAIRMAN:
John D. Black, Harvard University

TOPIC:
Needed Changes in the Collection and Presentation of Agricultural Statistics [3]

PAPERS:
Agricultural Statistics Viewed in the Light of a Changing Agricultural Program
Murray R. Benedict, Giannini Foundation for Agricultural Economics, University of California
Some Needed Developments in the Scope and Timing of Agricultural Statistics
O. C. Stine and C. M. Purves, Bureau of Agricultural Economics

DISCUSSION:
Bernard J. Ostrolenk, College of the City of New York
Theodore Schultz, Iowa State College
Ernest H. Wiecking, Bureau of Agricultural Economics
Henry Keller, Jr., New Jersey State Experiment Station

[1] Summarized by Meredith N. Stiles.
[2] To be printed as a chapter in *Demand, Production and Prices*, by Charles F. Roos, to be published shortly.
[3] To be printed in forthcoming issues of the *Journal of Farm Economics*.

12:30 *P. M.*—LUNCHEON MEETING (Betsy Ross Room, Benjamin Franklin Hotel) (JOINT MEETING WITH ECONOMETRIC SOCIETY)

PRESIDING OFFICER:

Stuart A. Rice, U. S. Bureau of the Census

TOPIC:

Statistical Planning in the Federal Government [1]

SPEAKERS:

Winfield W. Riefler, Economic Adviser to the Executive Council [2]
Stephen M. DuBrul, Acting Chief, Research and Planning Division, NRA

2:30 *P. M.*—ROUND TABLE CONFERENCES

ROUND TABLE I (Room 252, Benjamin Franklin Hotel)

CHAIRMAN:

Aryness Joy, Federal Reserve Board

TOPIC:

Cost-of-Living Indexes—Their Construction and Their Use [3]

PAPERS:

The Use of Family Expenditures in Cost-of-Living Indexes
Helen R. Wright, School of Social Service Administration, University of Chicago
Revising the Wage-Earners' Cost-of-Living Index
Margaret H. Hogg, Russell Sage Foundation
Measuring Changes in the Cost of Living of Federal Employees Living in Washington
Faith M. Williams, U. S. Bureau of Home Economics
Adequacy of the Sample in Budgetary Studies
Hugh S. Hanna, U. S. Bureau of Labor Statistics

DISCUSSION:

William M. Leiserson—Application of Cost-of-Living Indexes to Wage Problems
Clark Warburton, Emory University

ROUND TABLE II (Lafayette Room, Benjamin Franklin Hotel)

CHAIRMAN:

M. B. Folsom, Eastman Kodak Company

TOPIC:

Calendar Reform [4]

SPEAKERS:

Stuart A. Rice, Bureau of the Census
Charles F. Marvin, Chief, U. S. Weather Bureau
Walter Mitchell, Jr., Bureau of Foreign and Domestic Commerce [5]
Irving Fisher, Yale University
H. Parker Willis, Columbia University [6]
H. W. Bearce, Bureau of Standards, Department of Commerce

ROUND TABLE III (Room 210, Benjamin Franklin Hotel)

CHAIRMAN:

Arthur J. Altmeyer, Wisconsin Industrial Commission, Madison

[1] Digests to be printed in the April issue of *Econometrica*. [2] Not presented.
[3] The papers of this session were digested by the Chairman, Aryness Joy.
[4] See Report of the Committee on Calendar Reform on p. 219. Certain of the Speakers at this session favored the 12-month rather than the 13-month calendar.
[5] To be printed in a forthcoming issue of the *Journal of Calendar Reform*.
[6] Printed in the *Journal of Calendar Reform*, March, 1934.

TOPIC:

State and Federal Coöperation in the Collection of Industrial and Labor Statistics

PAPERS:

Type of Industrial Statistics for Joint Collection
Tracy E. Thompson, Ohio State University [1]

State and Federal Coöperation in the Collection of Industrial Statistics
Roswell F. Phelps, Director of Statistics, Department of Labor and Industries, Massachusetts

Using State Bureaus for the Joint Collection of Labor Statistics
Howard B. Myers, Assistant Director Research and Statistics, Federal Emergency Relief Administration

DISCUSSION:

R. H. Coats, Dominion Statistician, Ottawa, Canada
Ralph J. Watkins, University of Pittsburgh
LeVerne Beales, Bureau of the Census
Sidney W. Wilcox, New York State Department of Labor
Corrington C. Gill, Federal Emergency Relief Administration
Eugene B. Patton, New York State Department of Labor

ROUND TABLE IV (Room 202, Benjamin Franklin Hotel)

(JOINT MEETING WITH ECONOMETRIC SOCIETY)

CHAIRMAN:

Walter A. Shewhart, Bell Telephone Laboratories

TOPIC:

Analyzing Time Series [2]

PAPERS:

Analysis and Correlation of Time Series
Harold Hotelling, Columbia University

Analysis of Interaction of Economic Variables
Max Sasuly, Chief, Sub-Section of Mathematical Statistics of Recovery Analysis and Research, NRA

Elimination of Seasonal Variation
Victor von Szeliski, National Recovery Administration

Some Statistical Aspects of Random Series
H. T. Davis, University of Indiana and Cowler Commission of Economic Research

DISCUSSION:

Arne Fisher, Western Union Telegraph Company
Victor Perlo, Recovery Analysis and Research Division, NRA
Mordecai J. B. Ezekiel, Economic Adviser to the Secretary of Agriculture
Harry C. Carver, University of Michigan

2:30 *P. M.*—SECTION I (Room 244, Benjamin Franklin Hotel)

CHAIRMAN:

Leverett S. Lyon, The Brookings Institution

TOPIC:

Statistical Problems of Industries Under the Codes

PAPERS:

The Meat Packing Industry under an Agricultural Adjustment Administration Trade Agreement
Charles F. Sarle, Agricultural Adjustment Administration

The Automobile Industry
Lawrence H. Seltzer, College of the City of Detroit

[1] Not presented.

[2] Digests to be printed in the April issue of *Econometrica*.

DISCUSSION:

J. Frederic Dewhurst, Twentieth Century Fund
W. N. Loucks, University of Pennsylvania
Alfred H. Williams, University of Pennsylvania
Edwin B. George, Bureau of Foreign and Domestic Commerce

2:30 *P. M.*—SECTION II (Center Crystal Room, Broadwood Hotel)
(JOINT MEETING WITH AMERICAN FARM ECONOMIC ASSOCIATION)

CHAIRMAN:

Edwin G. Nourse, The Brookings Institution

TOPIC:

The Agricultural Census [1]

PAPERS:

The Agricultural Census as a Source of Statistics and as a Check on Intercensal Estimates
H. R. Tolley, Giannini Foundation of Agricultural Economics, University of California

Looking Forward to Coming Agricultural Census Enumerations
John D. Black, Harvard University

DISCUSSION:

F. F. Elliott, Bureau of Agricultural Economics
G. L. Stewart, University of Illinois

6:00 *P. M.*—DINNER MEETING (Betsy Ross Room, Benjamin Franklin Hotel)

CHAIRMAN:

William M. Steuart, Former Director of the U. S. Census

TOPIC:

Governmental Responsibility for Social and Economic Research

PAPERS:

Economic Research for Policy-Making Governmental Agencies
E. A. Goldenweiser, Federal Reserve Board [2]

Statistics as a Public Work
Willard L. Thorp, Director, Bureau of Foreign and Domestic Commerce

DISCUSSION:

Stuart A. Rice, Assistant Director of the Census
Donald R. Belcher, American Telephone & Telegraph Company

8:00 *P. M.* (Crystal Ball Room, Benjamin Franklin Hotel)
(JOINT MEETING WITH AMERICAN FARM ECONOMIC ASSOCIATION AND AMERICAN ECONOMIC ASSOCIATION)

PRESIDING OFFICER:

H. R. Tolley, Giannini Foundation of Agricultural Economics, University of California

TOPIC:

The Rehabilitation of Agriculture [3]

ADDRESSES:

The Administration's Agricultural Program
Hon. H. A. Wallace, Secretary of Agriculture

A Long Range View of National Agricultural Policy
B. H. Hibbard, University of Wisconsin

[1] To be printed in future issues of the *Journal of Farm Economics.*
[2] No manuscript submitted.
[3] To be published by the American Farm Economic Association.

DISCUSSION:
I. G. Davis, Connecticut State College
Frank D. Graham, Princeton University

FRIDAY, DECEMBER 29, 1933

9:00 *A. M.*—BUSINESS MEETING (Room 252, Benjamin Franklin Hotel)

10:00 *A. M.*—SECTION I (Edison Auditorium)
(JOINT MEETING WITH AMERICAN ASSOCIATION FOR LABOR LEGISLATION)

CHAIRMAN:
Stuart A. Rice, Assistant Director of the Census

TOPIC:
The Cost of Various Forms of Unemployment Insurance and Relief

PAPERS:
How Much Security Can Be Bought for a Given Percentage of Payroll?
C. A. Kulp, University of Pennsylvania [1]
Unemployment Rates, Insurance Benefit and Contribution Scales in Germany and Great Britain
Arnold Tolles, Mount Holyoke College [2]

DISCUSSION:
Morris E. Leeds, President, Leeds and Northrup Company, Philadelphia
E. M. Hugh-Jones, Oxford, England
Alvin H. Hansen, University of Minnesota

10:00 *A. M.*—SECTION II (Betsy Ross A, Benjamin Franklin Hotel)

CHAIRMAN:
Willford I. King, New York University

TOPIC:
Measuring the National Income and Its Distribution [3]

PAPERS:
The Importance of More Accurate Knowledge of the Volume and Distribution of the National Income
J. M. Clark, Columbia University
Problems in Measurement of the National Income
Simon N. Kuznets, National Bureau of Economic Research

DISCUSSION:
Morris A. Copeland, Central Statistical Board, Washington, D. C.
Willard L. Thorp, Director, Bureau of Foreign and Domestic Commerce
Maurice Leven, Brookings Institution
Edward T. Frankel, National Industrial Conference Board

10:00 *A. M.*
(JOINT MEETING WITH AMERICAN ASSOCIATION OF UNIVERSITY TEACHERS OF INSURANCE)

CHAIRMAN:
S. S. Huebner, University of Pennsylvania [4]

PAPERS:
Insurance Company Receiverships
S. H. Nerlove, University of Chicago
How Far Should Further Increases in Insurance Facilities Be Permitted?
Albert H. Mowbray, University of California

[1] To be printed in the *American Labor Legislation Review.*
[2] Revision to be printed in a future issue of the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION.
[3] Not printed here.
[4] See mimeographed Proceedings of the American Association of University Teachers of Insurance (non-members $1.00), Urbana, Illinois.

12:30 *P. M.*—LUNCHEON AND BUSINESS MEETING
(Crystal Ball Room, Benjamin Franklin Hotel)

CHAIRMAN:
Stuart A. Rice, President, American Statistical Association

SPEAKER:
Statistics and Economics
O. M. W. Sprague, Formerly Financial and Executive Assistant to the Secretary of the Treasury

12:30 *P. M.*
LUNCHEON MEETING WITH AMERICAN ASSOCIATION OF UNIVERSITY TEACHERS OF INSURANCE

CHAIRMAN:
S. S. Huebner, University of Pennsylvania [1]

PAPER:
Investment of Reserves Under Unemployment Insurance Plans
C. A. Kulp, University of Pennsylvania

2:30 *P. M.*—SECTION I (Rose Room, Adelphia Hotel)
(JOINT MEETING WITH THE AMERICAN SOCIOLOGICAL SOCIETY)

CHAIRMAN:
C. E. Gehlke, Western Reserve University

TOPIC:
The Use of Census Tracts [2]

PAPERS:
Significance of Infant Mortality Rates for Small Geographic Areas
Robert E. Chaddock, Columbia University [3]

Sampling Errors and Interpretations of Social Data Ordered in Space and Time
Frederick F. Stephan, Council of Social Agencies, Pittsburgh

Some Problems in the Correlation of Spatially Distributed Variables
Jerry A. Neprash, Franklin and Marshall College

Certain Effects of Grouping upon the Size of the Correlation Coefficient in Census Tract Material
C. E. Gehlke and Katherine Biehl, Western Reserve University

Demonstration of Map Spotting Machine
Earle E. Young [4]

DISCUSSION:
Howard Whipple Green, Health Council, Cleveland, Ohio

3:00 *P. M.*—SECTION II (Foyer, Benjamin Franklin Hotel)

CHAIRMAN:
Joseph H. Willits, University of Pennsylvania

TOPIC:
Who Should Collect Economic Statistics for Recovery and Planning?

PAPERS:
The Trade Institutes and Code Authorities
Wilson Compton, Executive Director, The National Lumber Manufacturers Association

[1] See mimeographed Proceedings of the American Association of University Teachers of Insurance (non-members $1.00), Urbana, Illinois.
[2] The papers of this session were abstracted by the Chairman, C. E. Gehlke.
[3] Revision to be printed in a future issue of the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION.
[4] No manuscript submitted.

The Code Authority in Coöperation with NRA or a Government Bureau
Roy A. Cheney, Underwear Institute, Washington, D. C.
By a Central Continuing Agency of the Government
Isador Lubin, Commissioner of Labor Statistics, Bureau of Labor Statistics

DISCUSSION:
Morris A. Copeland, University of Michigan
Roland P. Falkner, National Industrial Conference Board
J. Parker Bursk, University of Pennsylvania

3:00 *P. M.*—SECTION III (Crystal Ball Room, Benjamin Franklin Hotel)

CHAIRMAN:
Ernest Minor Patterson, University of Pennsylvania

TOPIC:
Experiments in Economic and Social Planning

PAPERS:
Planning Concepts Underlying Subsistence Homestead Projects of the Government
M. L. Wilson, Director, Subsistence Homestead Division, Department of the Interior [1]
A Statistical Analysis of the Food Requirements for the Population of the United States
Hazel K. Stiebeling, Bureau of Home Economics, U. S. Department of Agriculture
Land Uses Necessary to Meet the Food Requirements for the Population of the United States
O. E. Baker, Division of Land Utilization, U. S. Department of Agriculture [2]

DISCUSSION:
H. C. Sherman, Columbia University
P. K. Whelpton, Scripps Foundation for Research in Population Problems, Miami University
Joseph S. Davis, Food Research Institute, Stanford University, California

2:30 *P. M.*
JOINT MEETING WITH AMERICAN ASSOCIATION OF UNIVERSITY TEACHERS OF INSURANCE

CHAIRMAN:
S. S. Huebner, University of Pennsylvania [3]

PAPERS:
Effects of Inflation upon Life Insurance
M. Albert Linton, President, Provident Mutual Life Insurance Company
The Moratorium and Life Insurance
Robert Riegel, University of Buffalo

ALLIED SPEAKERS (10 minutes each)
Would Federal Control of Life Insurance Mean Improvement?
Frank G. Dickinson, University of Illinois
Is a Change in Investment Policy of Life Insurance Companies Toward Greater Liquidity Desirable?
H. J. Lohman, University of Pennsylvania

[1] Not printed here.
[2] To appear in the Proceedings of the Land Grant College Association Meeting for 1933, copies of which can be obtained from William A. Munson, Massachusetts State College, Amherst.
[3] See mimeographed Proceedings of the American Association of University Teachers of Insurance (non-members $1.00), Urbana, Illinois.

Should Surrender and Loan Values be Restricted?
J. M. Laird, Vice-President, Connecticut General Life Insurance Company
The Attitude of Companies in Accepting Large Amounts of Single Premium and Annuity Contracts
Edison L. Bowers, Ohio State University

6:00 *P. M.*—DINNER MEETING (Crystal Ball Room, Benjamin Franklin Hotel)

CHAIRMAN:
Frederick C. Mills

TOPIC:
Evaluating 1933

SPEAKERS:
Leonard P. Ayres, Cleveland Trust Company [1]
David Friday, Washington, D. C.[1]
Mordecai J. B. Ezekiel, Economic Adviser to the Secretary of Agriculture [2]
Hilding Anderson, New York, N. Y.[1]

[1] No manuscript submitted.
[2] Revision to be printed in a forthcoming issue of the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION. Mimeographed releases may be secured in advance from the author.

THE INDUSTRIAL AND COMMERCIAL AREA VS. THE POLITICAL AREA AS THE UNIT FOR THE COLLECTION OF BUSINESS STATISTICS[1]

PAPER BY JAMES N. HOLSEN

The research staff of the Southwestern Bell Telephone Company is engaged with the problem of providing a basis for improved long range population and market forecasts. In planning for the future, the central aim of the Telephone Company is to supply the right amount of facilities in the right place.

The specific population forecasting job of this Company involves individual forecasts for some 700 towns and cities scattered throughout the states of Missouri, Kansas, Arkansas, Oklahoma, and Texas, and also forecasts for the various regions of each state and for each state as a whole. It was thought that the mathematical formulas which have been devised for population forecasts place too much emphasis on past trends, especially when applied to individual cities or relatively small geographic regions.

The logical approach seemed to be surveys of each state in the region, involving an analysis and presentation of the following subjects: (1) natural features, including a study of topography, soils, climate, vegetation, and water resources, with respect to their influence on human activities; (2) the situation and outlook of the state's basic industries —agriculture, manufacturing, lumbering, and mining—in relation to population; (3) the comparative conditions and prospects of the various natural or economic geographic regions of the state, the regional treatment being essential because of the dissimilarity of conditions prevailing over most states; (4) an analysis of the situation and outlook of the principal cities; and (5) the effect of the probable population changes on the demand for telephone service.

In the division of a state into regions many elements, such as soil, topography, temperature, rainfall, location, minerals, industries, trade, and people were considered, and no one element was determining in all cases.

The delineation of regions in each state was a combined result of the collection and review of available information, and field work. As finally determined the regions varied in size from one to twenty or more counties, and in numbers in each state, from eight to eleven. Natural regions, of course, were found not to be circumscribed by state boundaries. While the aim was to have each region include areas in which

[1] Papers abstracted by Elma S. Moulton, Bureau of Foreign and Domestic Commerce.

fairly uniform forces were at work, it was found that complete homogeneity was impossible. One difficulty encountered was the practical necessity of following county lines, since most of the statistical data were on a county basis.

In analyzing the growth of a city and forecasting its future, there are usually five principal influences to be considered: (1) size and character of its tributary trade territory; (2) its industrial advantages; (3) its attraction as a home center; (4) government activities; and (5) institutional activities.

Study of the trade territory of a city is essential to an analysis of the population supported or likely to be supported by the wholesale, retail, and general office business of a city, and also, though ordinarily to a lesser extent, by manufactures. The term "trade territory" is often used rather vaguely, sometimes referring to the district tributary to a city's retail business, and at others, to its wholesale trading area. Also, it should be recognized that trade territories of different cities may overlap.

Aids in the definition of city trade territories include the analysis of banking relationships, newspaper circulation, and the distribution of sales of representative wholesale establishments. In this work, analyses of direction and flow of long distance telephone traffic were employed also, and to a large extent confirmed trade territories indicated by the other data used. Unfortunately the data necessary for such analyses of telephone traffic are not readily available, even within the telephone company.

In conclusion, some specific advantages resulting from the determination of natural regions are as follows: (1) The various natural regions of a state vary significantly in their opportunities and handicaps for utilization by man, and thus the regional treatment is essential to a proper appraisal of its market, present or prospective; (2) the regional treatment, which assumes adequate and sound knowledge of the economic activities of the region, is essential to a proper appraisal of the effects of changes in any one activity upon the overall conditions of a particular region; (3) the regional treatment appears to be almost essential to the development of sound programs of land utilization, and for other economic planning purposes.

PAPER BY ALONZO B. COX

Business is operated by individuals through organizations for the purpose of furnishing services to people. These business men require statistics to govern current operations and for long-time planning. As political boundaries rarely correspond to the meets and bounds of operating business units, statistics gathered on the basis of such artificial

territories generally give an inadequate and distorted picture for the use of business men.

Broadly speaking, the more usual business statistics may be classified as (1) statistics of production, (2) statistics of demand, (3) statistics of the stock and flow of goods, (4) statistics on prices, (5) statistics on capital, (6) statistics on accounting phase of business, and (7) human statistics, including income and cost of living.

In the main, statistics to be of most service to business executives must represent rather closely defined areas within economic regions. An economic region in the sense used here means that unit of area which is most effective in the utilization of a complex of major natural resources. Such areas are defined not entirely by natural resources but by such important matters as accessibility and the location of competing regions of prior development. The Gulf Southwest, including Texas, Oklahoma, a large part of Arkansas, Louisiana, and New Mexico, constitutes a well defined economic region. The general environmental conditions are similar, and what is more important, the region really constitutes one great supply and demand area.

A few examples show the importance of regional vs. state statistics. Not all parts of the Southwest produce cotton, and the areas which do produce it show a wide variety in the qualities grown. Moreover, individual regions vary from year to year in volume of production and to some extent in quality. The ideal set-up for gathering agricultural production statistics would be to re-define county areas to fit natural region lines. In the absence of that, a regrouping of counties in crop reporting districts may be made very serviceable. The Texas Crop Reporting Board has actually redistricted the state based on the natural regions as outlined by Mr. Johnson of the Bureau of Business Research.

The growers, manufacturers, and consumers are not interested in production in general but in the production of competitive qualities. Specific data are required also for grains, livestock, and other farm commodities.

State statistics serve no better in the production of minerals than of agricultural products. Natural regions are being recognized in petroleum production and refining, and figures are being reported accordingly. Manufacturing regions grow up likewise on a regional base to utilize certain natural resources and economic advantages.

Statistics of demand may seem to be on a different base from those of production. However, production determines to a large extent the quality as well as the volume of demand, and so the value of collecting distribution statistics along lines of natural production regions becomes evident. The distribution of income among people and the season of

the year in which it comes are fundamental factors in market analysis. Furthermore, complete data by natural regions will be of great importance for long-time planning.

The Bureau of Business Research of The University of Texas has been definitely planning coöperation with business men to work out ways of gathering and interpreting statistical data which will make them more usable. Mr. Elmer H. Johnson, the economic geographer in the Bureau, has delineated the natural regions of Texas. Statistics on cotton, livestock, poultry and eggs, petroleum, and other products are now being gathered and analyzed by regions by the Bureau. Data on sales and consumption, employment, wages, etc., are likewise being worked out along the same lines. These demand data are being associated with income figures from the natural regions, that is, production times price, to form the base for forecasting business and for estimating business trends.

In conclusion, business men rarely are interested in purely state figures because they correspond neither to their sources of supply nor the extent of their markets. Certainly a great step forward will have been taken when the regional characteristics of business data are recognized and the regions themselves constituted as units for gathering and analyzing business data.

PAPER BY RALPH J. WATKINS

When we look at an economic map of the United States we see, first, broad areas of primary production—agricultural, mineral, forest—determined by the location of natural resources; on the other hand, we see clusters of population surrounding centers of manufacturing, trade, and finance. We call these clusters metropolitan regions or industrial areas or commercial areas. These metropolitan regions are economic units of paramount importance—economic units in the production of wide ranges of wares and services and economic units in the consumption of goods gathered from the markets of the world.

Our specific task is to discuss the basis of delimiting these metropolitan regions for the descriptive and analytical purposes of economics. This task is essentially that of determining the limits of the area over which the economic influences of a central city spread or penetrate. The influence of a central city must be measured on a relative basis, i.e., in terms of the influences of competing centers. And these competing cities are of two main orders. First, there are other recognized metropolitan centers against whose influences those of the central city must be weighed; from this standpoint, the area of influence of a central city may be taken to mean the district in which the city's economic influences

predominate over those of other competing metropolitan centers. Second, there are smaller cities and towns in the territory surrounding the central metropolitan city, and these secondary centers exercise economic influence over their adjacent territories. The area of influence of a central city, then, may be taken to mean the area of predominance over all competing communities, including the secondary centers.

Some of the factors which have been used in determining areas of metropolitan influence are:

1. Topography.
2. Transportation: (a) railroad commuter service, (b) local bus service, (c) electric interurban service, (d) highways, (e) waterways.
3. Communication: (a) local telephone service, (b) postal service, (c) newspaper circulation.
4. Economic dependence: (a) financial relationships, (b) industrial control, (c) industrial homogeneity, (d) trade relationships.
5. Cultural and recreational relationships.
6. Population density.

It should be kept in mind that each of these factors might indicate a different area, and that with respect to each factor distinction has to be made between (a) predominance over any one competing center and (b) predominance over all competing centers. The accurate use of such criteria, therefore, generally would require practically as complete data on the competing centers as on the center about which the metropolitan area is being measured.

In terms of this statement of the problem, it is understood why areas of metropolitan influence have been generally determined on the basis of arbitrary decision or measurement of a single type of influence. The Bureau of the Census, for example, defines metropolitan areas in terms of density of population and industrial areas in terms of great development of manufacturing.

When the Bureau of Business Research at the University of Pittsburgh undertook the publication of a regional business review it was faced with the problem of delimiting areas for reporting purposes. Its decisions were in all cases arbitrary, dictated often by considerations of availability of data or practicability of covering a given area. For example, the carloadings data cover a rather irregular area because of the necessity of following division point breakdowns. Retail and wholesale sales data are for Pittsburgh only. The general indexes and employment statistics are for an eleven-county area. And here it may be important to point out that, as regards statistics of change in economic conditions, the precise determination of a metropolitan area is not a mat-

ter of great importance, since the central portion of the area will usually bulk so large in the total that there is little chance of error.

PAPER BY WALDO E. GRIMES

The work that has been done in determining agricultural areas in the United States has been confined to determining type of farming areas. A type of farming has been well defined as "a term descriptive of the kind of farming followed on a group of farms having a high degree of uniformity in the kind, relative amount, and proportion of the crops and livestock handled, and in the methods and practices followed in production." This definition is taken from the Census Monograph entitled *Types of Farming in the United States.* This work, based on the 1930 census, was directly in charge of Dr. F. F. Elliott, formerly of the Bureau of the Census and at present in the Federal Department of Agriculture.

In determining type of farming areas Dr. Elliott began with the individual farm and its combination of crops and livestock using gross income as the measure of type. The detailed character of the data and the facilities of the Bureau of the Census made it possible to build up from the individual unit, the farm. This method insures that important types of farming in an area will not be submerged by other more dominant types or by types that figure more heavily in results when other measures of type of farming are used. Also it permits, to some extent, the ignoring of the boundaries of political units, such as counties, where this is desirable.

The publication of census data by states and counties has the objection that it results in divisions where, from the economic standpoint, there is no division in the area and omits divisions that should be made. This can be avoided in part by publishing the data by the smallest political subdivision which in the case of agricultural data would be the township or its equivalent. The data could then be combined to better advantage in determining agricultural or other areas. An illustration of the difficulties encountered is a middle western city, the metropolitan area of which is in two states and five counties. The data as published give an erroneous impression unless one goes into a careful analysis of the situation.

It is sometimes contended that political boundaries should be ignored in determining areas for various purposes. In determining agricultural areas this cannot be done with safety. There are differences determined by the governments of states, counties, and cities, which must be considered. These differences may be caused by regulatory measures such as milk ordinances, by state policies and laws pertaining to land, or by

such factors as differing taxation policies and the varying development of highway systems by states and counties.

In using type of farming data as a basis for determining market areas caution should be exercised since the type of farming studies do not consider market outlets as such in determining areas. For example, a type of farming area may be in two or more market areas because of highway development, nearness to shipping points on different railways, differences in transportation costs and other factors.

From the standpoint of analysis of data for agricultural purposes it is desirable that data be available for the smallest political subdivisions and then these data can be combined according to economic areas, either considering or ignoring the boundaries of counties and states, whichever may be the more desirable as indicated by the various factors determining the extent of the area to be delineated.

PAPER BY PAUL T. CHERINGTON

As the basis for collection of business statistics, no area possibly can take the place of the political area. By constitutional provision, the population census must be compiled on that basis, and this makes the political unit necessary for all figures depending on the population census.

The real question we ought to be discussing is not whether some other type of area can be substituted for the political area in collecting these data, but what useful groupings of the data can be made (once they have been collected) in industrial and commercial, rather than political combinations.

Difficulties encountered in attempting to solve this problem have persuaded me that there neither is, nor can be, a single grouping of a city and surrounding places which can safely be called a "Trading Area." Trading is of too diverse a character to be used as a descriptive adjective in this connection.

After long working over this question of political and commercial areas I have formulated certain fairly well-defined views:

1. The figures must be gathered in political units.
2. For commercial purposes they frequently are not most useful in political units, and hence must be translated, or combined, into such commercial units as may be desired.
3. It may be most desirable to leave to individual initiative all such grouping into commercial units, supplying from official sources only the crude figures in political units as collected.
4. If there is any call for commercial regroupings by the Government, these should be of the nature of suggestive short-cuts, for emphasizing important points of great commercial significance, as, for ex-

ample, the great relative importance of the metropolitan areas in the country totals, as compared with that of the corresponding cities themselves.

The attempt to indicate commercial areas should not be regarded as an exact process. At best, it is the substitution of one approximation for another. Its only justification lies in its nearer approach to actual commercial practice than can be found in figures grouped for political purposes.

PAPER BY CASIMIR A. SIENKIEWICZ

There has developed in recent years an insistent demand for dependable information on business conditions, not only by such major divisions as those typified by the Federal Reserve districts but also by smaller industrial and commercial areas. In view of keen competition in the marketing of goods, with the consequent narrowing of profit margins, sales and advertising managers have been seeking eagerly market statistics and analyses of business conditions in order to attain efficiency and economy in the distribution of their goods. It seems hardly necessary to point out the value of such economic measurements as indexes of production, employment, payrolls and man-hours, and of distribution of commodities by states or by Federal Reserve districts, or by any areas possessing industrial and market homogeneity.

In the Philadelphia Federal Reserve District, a highly diversified territory in point of manufacturing and types of occupations, the composition of the manufacturing industry as a whole has not changed materially in the past dozen years. Within the district, however, some of the industrial areas have undergone considerable changes, as may be illustrated by Lancaster County. Not so long ago this county was primarily an agricultural section, known chiefly for its production of tobacco; today, contrary to popular thought, manufacturing is its principal industry, the value of its manufactured products by far outweighing that of its agricultural products. No such change occurred in the state as a whole.

Under such circumstances it may be necessary to break down the district indexes into more localized measurements. The diversity of interests and the measurements of their changes should be recognized all along the line if the quality and usefulness of the statistical information are to be improved.

The Department of Research and Statistics of the Philadelphia Federal Reserve Bank early in its organization recognized the importance of subdividing statistical information by regions. In its original form this subdivision consisted only of simple comparisons of total figures

for employment, retail trade, and building permits in certain leading cities. In 1924, however, a study of industrial areas within the district was completed. In this study, industrial and market similarity were considered of prime importance in defining the industrial areas. Especial emphasis was given to the character of industries located in the principal cities and surrounding towns, the working population, the type of natural resources, topography, transportation facilities and certain common merchandising factors. County limits were disregarded. For each of the sixteen areas delineated, statistical information was given for factory employment and payrolls, retail sales, debits to individual accounts, building permits, and, in some instances, building contracts awarded.

This study served a useful purpose, though in recent years, with the availability of more detailed data and in view of rapidly changing conditions, the indexes for these areas began to show certain fundamental defects. The splitting of counties between areas increased the difficulty of checking the indexes with census figures.

When in 1931 and 1932 it became necessary to revise the indexes of factory employment, payrolls and employee-hours for Pennsylvania, the boundaries of the industrial areas were defined by county lines. The state was divided into twenty industrial areas, each consisting of one whole county or more, and monthly indexes of employment, payrolls, and employee-hours have been constructed for each area.

The manifold complexities in obtaining regional information even by larger areas were realized even more keenly when the task of constructing an index number of productive activity in the manufacturing industry of the entire district was undertaken in 1930 and 1931. The state and Federal censuses provided reasonably accurate basic data for the district proper. The real difficulty was in securing current series of monthly figures by lines of manufacture. Most of the forty-five series finally obtained, representing about two-thirds of the total output of manufactures in the district, related directly to the area covered by it. The possibility of subdividing this index number by industrial areas within the district was considered but found to be out of the question for the time being.

Since the census figures afford the most reliable statistical material for checking and adjustment, as well as for other purposes, current reporting by industrial or commercial areas, as against political subdivisions, seems hardly feasible until and unless new subdivisions in the census data are made. Needless to say, this is a tremendous problem and it would be almost impossible to break down the figures for the past census years.

PAPER BY F. L. CARMICHAEL

Studies made by the Bureau of Business and Social Research of the University of Denver indicate that commercial area boundaries may be widely different from those of political areas. In the definitions of commercial areas within the Rocky Mountain states, population statistics by counties have been found useful.[1] The purpose of this paper is to describe this approach to the problem and to present certain corroborative statistical evidence.

Important industrial or commercial centers are surrounded by comparatively thickly settled areas. Within the area reached by a given center, there is a tendency for the density of population to decrease as the distance from the center increases. If this law holds true, as appears to be the case in the Rocky Mountain states, a line drawn around a commercial center—through the points where population density ceases decreasing and begins to increase—will define the logical trade area.

Such a line may be drawn roughly to enclose Colorado, Wyoming, the northern half of New Mexico, and smaller portions of South Dakota, Nebraska, Arizona, and Utah. The Eastern Rocky Mountain Region as defined by the Rocky Mountain University Research Council was divided into twenty subareas, for purposes of detailed study.[2]

Boundaries follow county lines in all instances. In other sections of the country where important centers are not separated by great distances, a breakdown of population and of other statistics by areas smaller than the county may be needed.

Points midway (by rail) between Denver and important cities to the north, south, east, and west have been plotted. The midway points to the east and the west are located short distances to the east of the respective boundaries as already defined. As a partial explanation of this discrepancy, however, there is the traditional tendency to ship raw materials to the east and to make purchases from the east.

Automobile traffic is largely concentrated in the eastern half of Colorado, with the north-south roads through Denver and Colorado Springs the main trunk. Toward the boundaries of the region the volume of traffic is small in the case of all roads. This suggests that the volume of business originating within the region and carried on by automobile or truck with the outside is comparatively small. This is further corroboration of the validity of the boundaries chosen.

[1] Cf. "Population and Market Areas in the Rocky Mountain States," *University of Denver Business Review*, Vol. 7, No. 2, February, 1931.

[2] The Rocky Mountain University Research Council, organized for the purpose of coördinating social science research in Colorado, Wyoming, and New Mexico, has made extensive analyses of economic statistics of the Eastern Rocky Mountain Region. These analyses were made with the collaboration of the U. S. Department of Commerce.

SOME PROBLEMS IN THE CONSTRUCTION OF AN INDEX NUMBER OF RENTS[1]

By Jacob Perlman

An adequate index of housing rents, both as an end in itself and as a component part of the entire cost of living, is at present the subject of considerable attention among statisticians and others. On the surface the construction of such an index number seems relatively simple, but a close examination of the problem reveals numerous complexities. The object of this paper is to touch on several of the more important questions involved in (1) selecting the sample, (2) collecting the data, and (3) computing the final index numbers.

The selection of a sample which is truly representative of its "universe" is the first problem to be met in the construction of an index of rents. At the outset this presents great difficulties, for no comprehensive survey of housing has ever been made in this country, and without a thorough knowledge of the "universe" studied, it is obviously impossible to judge the adequacy or inadequacy of a sample. Several related studies of housing and its costs are now being started under the auspices of the Civil Works Administration. It is hoped that this action will mark the beginning of a periodical and comprehensive census on the subject.

A comprehensive census of housing should be based upon a detailed analysis of the problem, in order that data relative to rents may be coordinated with other aspects of housing conditions. So far as rent is concerned, the information collected should be classified in various categories according to type of house (whether one-family detached, semi-detached, or in a row; duplex, whether in a row or not; and apartment), number of floors, age and general condition, size of yard, nearness to transportation and certain outside conveniences (shopping district, school, church, etc.), character of neighborhood, number of rooms, various inside conveniences (garage, porch, elevator, heating system, running hot and cold water, toilet facilities, bath, gas and electricity, telephone, refrigeration, air conditioning, etc.). In addition, some facts should be available with respect to the tenant and the conditions of the rental bargain. If possible this census should embrace the entire country, or at least the chief industrial centers, supplemented by a sample of smaller towns and rural territory. It should be repeated about every ten years, preferably at the time of the regular decennial census. A

[1] In preparing this paper the author wishes to acknowledge the use of certain material on the rental data of the Bureau of Labor Statistics by Miss Margaret C. Klem.

comprehensive survey of housing in the United States would furnish an excellent basis for the selection of a sample, which could be made to include all the above elements in approximately the same proportions as they appear in the "universe."

At the present time, however, it is necessary to develop a sample for an index number of rents without a census of housing conditions. Such a sample is now being used by the United States Bureau of Labor Statistics in connection with the rent item in its index number of the cost of living. About 32 industrial cities are included in this survey, and the lists of dwellings in each one of them were originally obtained by field agents from rental agencies and similar organizations, the above places being presumably located in sections inhabited by workingmen's families. The number of dwellings for which rents are gathered is based on a quota, the latter corresponding roughly to the population of the city. Not more than ten quotations are obtained for any block of houses of like build and rental, and in case of apartments the number is limited to about one-half the total in the building. An attempt is made to maintain the same fixed list of dwellings in the sample by obtaining information from the same agencies each time. If any of these agencies go out of business or give up some of their dwellings, the Bureau tries to get in touch with the companies or organizations which have taken over the places. From time to time certain dwellings are dropped from the list for a variety of reasons, for example, when the rent falls below a minimum figure, when a colored family moves in, when the dwelling is vacant for more than two years, when some radical alteration in the premises occurs, when the building is converted for non-residential uses, or when it is completely demolished. In such cases the Bureau substitutes a new dwelling with a rental value, which over the last few periods of survey is roughly equal to the average figure of the one that it has replaced.

The sample used by the Bureau is subject to criticism on several important points. In the first place, the 32 cities covered are admittedly overloaded with shipbuilding centers selected during the War. In the second place, the method of its selection in each city is a dangerous one: the dwellings are taken from the lists of real estate agencies and like bodies without inspection by the field agents, and hence there is absolutely no guarantee that the characteristics of the places and their distribution conform to the requirements of a representative sample for the "universe" under consideration. This method of selection also fails to include many dwellings rented by smaller agencies or leased directly by the landlords. In the third place, the practice of obtaining substitutions with rents similar to those of the dwellings dropped has a tendency

to degenerate the sample constantly, for not only are the remaining houses gradually depreciating but the ones added tend to perpetuate that process. Furthermore, no attempt is made to rebuild the sample by taking into account newly constructed houses and others that have been converted for residential use in the meantime. Lastly, the Bureau's custom of carrying vacancies on its lists for two years tends to create an upward bias in the rent data, which results from the reluctance of agencies to lower the listed rent until the place is actually rented.

Accordingly, it seems that a new beginning must be made in the selection of a sample for rent reporting, and, in the absence of much knowledge concerning the "universe," it is important that the work should proceed with considerable care. The first step is to decide upon the places to be covered, taking into account a number of factors, such as the size and composition of the population, the nature of the local industries, the geographical location, etc. The next step is to become acquainted with all aspects of housing conditions in each locality, consulting intensively the various local housing specialists. It will then be advisable, with the aid of a map, to divide each city into homogeneous districts, after which one is ready to proceed with the selection of the sample. Miss Margaret H. Hogg, of the Russell Sage Foundation, has wisely suggested that the choice be made on the basis of blocks selected at regular intervals and including all the dwellings within each one so selected. The total number of dwellings listed will depend on the size of the city's population. In order to insure the representativeness of the sample, it will be advisable to cover at least 10 per cent of the total number. The dwellings thus selected will constitute a permanent list, except that buildings will be immediately dropped from the list when they are vacant and when certain specified changes occur in the premises. Miss Hogg suggests that complete blocks of newly built houses should eventually be substituted for the dwellings dropped. It is, of course, assumed here that the dwellings in the original sample, as well as in the substitutions, will be selected after actual visits to the tenants by well-qualified field agents.

When quotations on rents are obtained one essential fact must be remembered, namely that "rent," unlike many other items, is not a simple unit cost but a composite of a large number of factors. Consequently, rental data must be gathered with greater care than is necessary in other surveys, in order that the figures obtained may always represent the same combinations of units.

Perhaps the first consideration in obtaining rent figures is the choice of a source of information. The Bureau of Labor Statistics, to econo-

mize time and expense, collects its data from rental and other agencies, and the amount of information obtained is limited to one line per dwelling, the items being the address, the type of place (house, flat or apartment), the number of rooms, and the rent per month. A more accurate picture of housing conditions would necessitate the collection of more extensive data which would doubtless require a whole questionnaire for each dwelling, supplemented by any additional facts, best obtained directly from the tenants.

A second consideration has to do with the methods to be used in collecting the information. In some instances it may be possible to employ the mail-questionnaire. If, for example, a certain tenant has once furnished the basic data with respect to his dwelling during a personal interview, correspondence may suffice to obtain a statement of his monthly rent supplemented by a limited amount of further information at regular intervals. There are, however, certain limitations to the mail-questionnaire method: many tenants will not be able to make out the report or will neglect to send it in. In other words, it will be necessary in many cases to resort also to the field method of investigation, which may be organized in one of two ways, either by coöperation with local specialists or by visits from the field agents of the office engaged in the work. Wherever no reliable local specialists (such as real estate boards, university research bodies, etc.) are obtainable, the collecting agency will have to use its own field workers—a method followed by the Bureau of Labor Statistics. The latter has adopted the practice of rotating its field agents, i.e., sending a person each time to a new place. This procedure helps to enrich the experience of the agent, but it does not permit him to acquire intensive knowledge of the locality, a qualification which is highly essential in an analysis of the housing situation. Accordingly, it seems that the better plan would be to permit the field workers to specialize in a given area.

A third consideration deals with the frequency of assembling information. The Bureau collects data twice a year, in June and December —a procedure which is quite satisfactory in view of the fact that most families move just prior to these months. However, if circumstances permitted, it would be a good idea to collect quarterly statistics.

A fourth consideration is the compilation of certain basic information for each dwelling on the list for the current reporting of rents. It has been noted above that the subject of "rent" is a highly complicated one, and hence it is important at the outset to enumerate the various elements for which the tenant pays his rent. Data similar to those listed above in outlining the characteristics of a comprehensive housing census should be collected when the tenant is first interviewed. A record

of this basic information should be kept in the office of the collecting agency.

The next consideration has to do with the nature of the data to be obtained currently from the tenants. In addition to the monthly rent quotations, it will be necessary to note any changes in the dwelling or rent bargain which may have occurred since the last report. It is very important to have a knowledge of such changes, as they help to explain the rent figure, and they also furnish at times a basis for its readjustment in the editing process. For example, there may have been certain radical alterations or new installations in the place, which, in the absence of a corresponding increase in rent, really amount to a reduction. Concessions granted by landlords constitute another problem. None of the above information is obtained by the Bureau of Labor Statistics, but, in order to make the figures comparable from one period to the next, it is essential that all these conditions should be known.

A few more questions arise in connection with the compilation of rent data. Should the rental figure be adjusted if the tenant pays only part or none at all? It appears that no adjustment is required in such a case, because after all the non-payment of rent constitutes a debt against the tenant, and, if he fails to pay, the landlord contributes to his upkeep so far as this item is concerned. There is also the question of the inclusion of furnished apartments, but, since the index number of the cost of living already has a separate item for furniture and furnishings, it is only logical to exclude the latter from the rent element by listing only unfurnished dwellings. Lastly, there is the question of families owning their own homes, in which case it becomes necessary to convert the payments made by them into a rental equivalent, a step complicating the calculation to such an extent that it may be advisable to exclude such places altogether. The latter procedure is now followed by the Bureau.

The last phase of the work consists of computing the final index numbers, which are designed to measure the relative changes in rent from one period to the next.

One method which may be employed consists of calculating aggregates for the two successive periods, using only those dwellings for which figures are available both times, and then converting them into link relatives, which may later be used to construct chain index numbers with a fixed base. Such a procedure may be used for each of the individual cities as well as for the country as a whole. This method is employed at the present time by the Bureau of Labor Statistics.

Another method involves the calculation of link relatives separately for each dwelling for which data are available in both periods. The

link relatives are then added and divided by the number to obtain the average, the latter being likewise used as a basis for computing chain index numbers with a constant base. This also may be done for each individual city and for the United States as a whole.

In order to obtain a more accurate picture of the relative changes in rents, it is necessary to weight the component figures. In case of the index numbers by cities the weighting should be according to the type of house, color of the tenants, etc., the latter being determined by the census of housing. Lastly, to construct the final index number for the country as a whole, the index number of each city must be multiplied by the population or some other factor.

There are a great many other problems to be considered in the construction of an index number of rents, but it is impossible to enter into a discussion of them here. Suffice it to say that the present data on the subject are inadequate for all purposes, and it is hoped that in the near future the index number will be thoroughly revised and expanded.

DISCUSSION

By Ewan Clague

Mr. Perlman has discussed very clearly and cogently some of the basic problems arising in index number construction in this field. I shall draw upon some of my own recent experience in the collection of rental data to illustrate further some of the points he has made, and to focus attention upon the problems which seem to me to be fundamental. There are five points which I should like to make in this connection.

1. *Vacancies.* The practice in the Bureau of Labor Statistics is to include in the index vacant dwellings at the monthly rental asked by the real estate agent, at least until the dwelling has been vacant for two years. The following table shows the effect upon the index of including vacant dwellings at the quoted rate (these data are taken from actual reports to the Bureau).

Type of Dwelling	*December 1931*	*June 1932*	*December 1932*	*June 1933*
House	v. $30.00	$28.00	v. $28.00	$25.00
House	22.00	v. 22.00	v. 20.00	18.00
House	35.00	v. 35.00	v. 35.00	25.00
House	35.00	35.00	v. 35.00	25.00
House	45.00	45.00	v. 40.00	35.00
Apartment	40.00	40.00	v. 40.00	25.00
House	47.50	v. 45.00	v. 45.00	30.00
House	40.00	40.00	v. 40.00	30.00
House	32.50	32.50	v. 32.50	25.00

v. — vacant.

Note that in nearly all cases the rate remains fixed during the period of vacancy but drops sharply when the dwelling is rented. Even when declines take place during the vacancy period, they do not seem to prevent a further drop at the time of actual renting.

It seems to me that the data demonstrate the fact that the rents quoted during the vacancy period are too high; in fact they may be little better than nominal. The tendency seems to be for the landlord to quote the old rate down to the very moment of re-renting, even if he has some mental reservations long before the new tenant is obtained. The effect upon the rent index is quite clear—the quotations on vacant buildings at nominal rates have the effect of holding up the index during a period of rent declines. Therefore, the index is likely to be sluggish on the down grade; at any one period it may be some points above an index based only upon occupied dwellings. I am inclined to question the desirability of including vacant dwellings in a rent index.

2. *Concessions.* Even the picture given in the table above does not adequately represent the true situation with respect to rents. The figures in the last column show the monthly rent actually being paid in June, 1933, but we have no evidence as to the concessions which the new tenants may have won—say, one or two months' free rent at the beginning of the contract. Concessions represent very real and tangible benefits accruing to the tenant and should somehow be expressed in the rent index.

Concessions sometimes take the form of free rent for a certain period of time, as indicated above, but they also occur as improvements, such as the addition of a garage, the installation of an electric icebox, etc. In some respects these improvements are scarcely more than maintenance and repairs to keep the dwelling in good condition, in which case they may properly be ignored, but in others they represent substantial additions to the tenant's accommodations and, *for the moment at least,* should be somehow represented by a differential in the rent. Note that the failure to use concessions in averaging down the monthly rent has the effect of holding up the rent index during a period of decline.

3. *Collections.* Should the rent be listed at the amount charged or the amount actually collected by the landlord? We ran into this problem in a small survey of unemployment relief housing in Philadelphia, conducted by the Research Department of the Community Council of Philadelphia. Reports from 127 real estate agents, covering 13,868 occupied dwellings, showed that out of a total monthly rent charged of approximately $350,000, only about $240,000 was collected in the current month (February, 1933); thus, collections averaged only 69 per cent of the charges.

I realize, of course, that unpaid rent is analogous to the bad debts of a business concern and that, therefore, no allowance ought to be made for it. On the other hand, the landlord is in a very special position so far as rent collection is concerned, that is, he is subject to certain legal and traditional restrictions, which handicap him to some extent. For example, the merchant can ease out of an unfortunate credit extension by refusing further merchandise, but the landlord often finds himself in the position of continuing to supply housing accommodations to a family long after he has given up all hope of obtaining any payment on current charges, to say nothing of arrearages. Sometimes the situation reaches the point, as shown in our Philadelphia study, where from 5 to 10 per cent of the tenants are living rent-free, no charges whatever being made by the landlord. Should the rent in such cases be recorded as zero? You will note that I am raising questions rather than solving them; I am not sure just what should be done about the problem of rent collections.

4. *Sampling—Substitutions in a Fixed List.* The present procedure in the collection of rent statistics is to select a list of houses in the city and to maintain this list indefinitely, except insofar as substitutions become necessary. Certain general provisions governing substitutions are laid down, but substitution can occur only when one of these rules comes into operation. The result is that the list tends to remain comparatively unchanged over considerable periods of time. The net effect of this procedure is to depress the rent index, since the quotations are obtained from steadily depreciating dwellings, many of which are not kept in good condition by regular maintenance and repairs. Of course, there is a limit to the decline because one of the rules of substitution is that when a house falls below $15 a month, it must be dropped from the list.

Even when a substitution is made there is no guaranty that the difficulty will be corrected. The new selection is likely to have about the same rent as the old one, but it will have much better accommodations —newer construction, better neighborhood, though possibly farther away from the center of the city. Thus, the process of substitution results in much better accommodations being reported at the same rent as the old, and the depreciation of the newly-selected house then carries the rent index on downward.

5. *Sampling—Random.* The net results of the tendencies outlined above are to cause the trend of the rent index to be generally downward, that is below what it should be, but to make it sluggish during business cycle changes, the index being too high at any one point on the decline and too low on the rise. Since these two basic tendencies, trend and

cyclical, work in opposite directions part of the time, the index is to some extent protected from too great a divergence from the true line.

Is there no other way of handling the rent problem? Must we operate with a fixed list? Just to get the matter clear before us, I am going to be so radical as to suggest an alternative procedure which will, I know, seem positively painful to some of you. Mr. Perlman referred to the random sampling method advocated by Miss Hogg. Suppose we went so far as to sample at random from the entire city each time the rent index was computed? What I mean is this: each December and each June, all the dwellings in a certain city would be made eligible for canvass and selection from them would be made purely at random, say, a 5 per cent sample. It would only be by chance that the same dwelling was selected in two successive periods, and if it were, no attention would be paid to this fact. This method would insure a good sampling of all dwellings in the city—new houses as well as old, detached houses and apartments, suburban areas and city slums. My contention is that over a long period of time an index computed from these averages would more accurately represent the trend of rents in that city than an index computed from a fixed list. I see many disadvantages to the method and I can forecast some of your criticisms, but I make this suggestion to get this problem of sampling out in the open and to make sure that all possibilities are thoroughly canvassed. I hope that at the very least future rent indexes will contain more of an element of random sampling than they have in the past.

OPERATING COST VARIABLES IN A LOW RENTAL HOUSING PROGRAM

By Asher Achinstein

In the United States advance in statistical information concerning the operations of any industry has depended largely upon the organization of the industry and the extent to which public regulation has prevailed. In many industries, especially during the post-war years, trade associations have assembled data which purport to reflect current operations. In other industries such as railroads, the statistical information that is available is mainly the result of the efforts of governmental agencies in assembling materials useful for regulatory purposes.

The building industry has had neither the organization nor the kind of governmental regulation which would produce quantitative data for measuring its activities. (I am excluding, of course, the valuable work of such private concerns as the F. W. Dodge Corporation.) Records concerning costs are lacking when "jobs" are so varied and when practice differs widely in various localities. During the post-war years, large contracting organizations have assembled cost data of office buildings, high-class apartment houses, and public buildings, but the figures have been closely guarded. In the construction of moderate priced dwellings by speculative operators who built for quick turn-over, there has been no incentive for keeping detailed records of construction and operating costs. Neither were financial institutions, which once had the reputation of being "conservative," a great force in promoting the cause of keeping adequate records of operations. As long as interest and taxes were met and mortgage renewal fees came in every three or five years, little interest was shown by lending institutions in cost data.

What has all this to do with operating cost variables of low rental housing? These remarks indicate two things. First, they explain why we have so little data concerning operating costs in the low rental field. With the type of financing and the system of residential construction which prevailed especially during the post-war years, the new dwellings were not built to come within the low rental class. The old tenements in blighted areas that have been standing from fifty to one hundred years can furnish little guidance in finding out operating costs of projects with improved living standards for families with relatively low incomes.

These illustrations also remind us that operating cost variables are a function of the original cost of the project. In low cost housing projects, operating expenses per room per month will increase by approximately 50 cents with each additional dollar a square foot that is paid for land.

Increasing the cost of construction by 10 per cent will raise operating costs by 75 cents to $1 per room per month. By operating costs I mean the total of *all* expenses that are included in operating statements of owners of property and not only costs referred to as maintenance.

When we mention the buildings of the Metropolitan Life Insurance Company, the Phipps Estate, the City and Suburban Homes Corporation, the City Housing Corporation, the Rockefeller projects, the Rosenwald and Marshall Field Developments, the Buhl Foundation and the projects under the jurisdiction of the New York State Board of Housing, we have included all of the limited dividend housing developments whose experiences in operation are valuable. I propose to limit my discussion to operation costs of projects under the State Housing Law because the data published by the Board of Housing are, despite their limitations, the most reliable of any for comparative purposes. The records are available in summary form in the Board's annual reports.

A few words about these limited dividend corporations. Corporations under the New York State Housing Law are limited to rentals of $12.50 per room per month in Manhattan and $11 per room per month elsewhere in the state. They are also limited to a return of 6 per cent on their equity. Until recently the mortgage indebtedness could not exceed 66 2/3 per cent of the total cost of the project and the interest rate could not be more than 5 per cent. The total cost of the eleven projects now operating under the Board's jurisdiction is a little over ten million dollars and accommodations are provided for almost 2,000 families in approximately 7,450 rooms. The projects vary in size and in type of plan. Two corporations are coöperatively owned by the tenants, one corporation is a semi-philanthropic organization in which the stock is held by a large number of individuals, four other developments are owned by commercial operators. Some of the buildings are six-story elevator structures and others are five-story walk-up buildings. All are of non-fireproof construction and are located in New York City. A year from now, when funds allocated for applications approved by the State Board are spent, and projects costing $26,000,000 and housing over 5,000 families are erected, valuable data in operating costs will begin to be accumulated.

In low cost housing developments the desire is to attain the lowest possible rent results in tenant rentals that are approximately equal to the total operating expenses. Strictly speaking, the rentals of apartments are equal to the total expenses plus a limited surplus for payment of dividends or perhaps other allowable reserves.

In the type of structure under the regulation of the New York State Housing Law, the largest item in the rent dollar is the payment of

interest. Over one-third of the total annual disbursements of these corporations is expended for interest on mortgage indebtedness. The next largest item is depreciation which averages 18 cents in the eleven projects. Interest and depreciation then, comprise approximately half of the rent dollar. Forgetting for a moment the accountant who treats depreciation both as a reserve in the operating statement and in the balance sheet, this item represents the cost of financing in a very real sense. As a matter of fact, the amortization on the mortgage which appears each year as a reduction in the mortgage liability is almost wholly paid out of the sum set aside for depreciation. I am fully aware of the technical distinction between amortization and depreciation but from the point of view of practical operation, it is correct to assert that one-half of the rent paid by tenants living in a project operating on the limited dividend principle is used for meeting annual financial charges.

The success which a housing program has in obtaining low rentals depends upon the savings in these costs. If, as is now the case under the Public Works Administration, these projects paid an interest rate of 4 per cent instead of 5 per cent the rentals would be reduced by between 75 cents and $1 per room per month. If the amortization rate is cut from 3 per cent to 1½ per cent there would be a further reduction of a little over $1 per room per month.

If projects are erected that will receive a 30 per cent grant on labor and materials as is contemplated under the operations of municipal housing authorities, there will be a further reduction in rentals of at least $1.25 per room per month.

Projects under the law are exempted on their improvements and only 4.8 cents is paid out for taxes on land. The remaining group of expenses referred to as maintenance cost comprises about 33 per cent of the rent dollar. Under maintenance are included wages, fuel, electricity, water, supplies and repairs, elevator and garden expense, office salaries and expenses, legal and accounting fees and the "catch all" of miscellaneous operating.

The average maintenance cost of all Housing Board projects since their first year of operation has been approximately $43 per room per annum. However, an average on the basis of projects which vary in size from forty-four to several hundred apartments is not nearly so significant as the average of projects of approximately the same size. That size (and also perhaps increase in experience) is an important influence upon total maintenance cost may be seen in the case of the largest development under the Board's jurisdiction. In 1928 when this particular project was half the size that it is today, the wage bill was 50

per cent above that in 1932 and the expense of administration about 40 per cent larger than in 1932. The price decline between 1928 and 1932 was not nearly so important a factor as that labor and management were in charge of a development with twice the number of tenants.

The maintenance costs of this development are perhaps a better guide than any other single project for indicating the various items of maintenance. During five years of operation, the wage and fuel bill each averaged approximately $1 per room per month, painting amounted to 66 cents, administration 37 cents and electricity, repairs, water taxes and other miscellaneous expenses amounted to 53 cents per room per month. The total maintenance cost was $3.50 per room per month or $42 per annum. In analyzing new projects the Board computes annual maintenance at $40 per room. Although the cost in one or two projects are out of line, we are aware of the conditions of inefficient management and are attempting to correct these conditions accordingly.

With smaller room sizes the cost of redecoration will be less and with increased size of project there will be further economies in wages and salaries. But whatever the economies, the maintenance cost figures are not likely to be nearly so low as some data which I have seen prepared by enthusiasts who are eager to demonstrate that six dollar rentals are possible in the slum areas of Manhattan.

In different sections of the country where land prices are relatively low and one, two, and three-family dwellings are erected, the total cost per room will be less and the operating costs will be lower correspondingly. Maintenance costs will also be less as there will be savings in the wage bill, the expense for light and power and perhaps other economies will be possible.

The job of governmental regulation is particularly important at this point. The other expenses such as interest, depreciation, taxes and insurance are relatively fixed. Maintenance, however, is the item of greatest variability. The relative efficiency of management as well as the effectiveness of governmental regulation comes to a test at this point. Quarterly and annual reports must be submitted to the regulatory agency to assist it in checking up on the operations of the project. Auditing of financial statements, however, is not sufficient; periodical inspection is equally important. If projects are promoted by commercial operators who are eager "to milk" the project as much as it can stand for their own use, costs will be padded. To obtain the maximum return, which is permissible under limited dividend company operation, unimaginative operators will skimp in services rendered, unless kept to the mark by the standards required by a regulatory agency.

In analyzing this phase we are led to the conclusion that housing is a

local problem and that effective regulation cannot take place by means of a governmental agency in Washington. Housing is a state and municipal problem. A high degree of centralization may be necessary in promoting a housing program in a country in which housing consciousness has awakened but recently. The lack of preparedness of municipalities and commercial operators in promoting low cost housing may make necessary the present set-up in Washington and the creation of a federal housing corporation. Erection of these projects is only one phase of a housing program; their operation is another.

Toward furthering a housing program the statistician must play an important rôle. He must devise units of measurement to aid in the job of regulation. When efficiency of management is compared, the expenses of the various projects are reduced to a room basis, but as soon as we begin to analyze the basis of comparison it is found that the room becomes a subject of metaphysical discussion. Is the foyer part of the room? In New York City a kitchen less than 49 square feet is not a room under the Multiple Dwelling Law. There are all kinds of rooms, rooms with 8 feet ceilings and 9 feet ceilings; apartments with living rooms of 135 square feet and with living rooms of 210 square feet, etc. Projects also vary in the amount of waste space of public hallways and internal corridors. The practice of allowing a half room for a dining alcove as is permitted under the New York and New Jersey State Housing Laws is a needless complication and the laws should be amended accordingly—if for no other reason than the peace of mind of the statistician.

There is, also, the question of the classification of accounts. From the accounting angle, one set of expense items may be satisfactory but for statistical purposes other bases of classification are necessary. The statistician must devise more detailed classifications in functional terms of the operations of these projects.

The use of federal funds for low rental housing projects will open a new era, not only in the kind of product which the building industry will be engaged in producing, but should also result in statistical data that will delight the heart of the statistician.

CONSTRUCTION COST STATISTICS

By James S. Taylor

A good technical introduction to our subject is furnished by the Federal Bureau of Public Roads index of the cost of highway construction. The data, which are presented by Mr. J. L. Harrison in an article in *Public Roads* for July, 1933, deal with a relatively simple and well-standardized type of construction operations, and yet shed much light on the deficiencies of the cost indices upon which economists, statisticians, and others interested usually have to depend. The Bureau makes use of the bid prices received by highway officials from contractors —a method that avoids considering the subdivision of the contractor's costs into labor, materials, supervision, and other items. It thus differs radically from the so-called "synthetic" indices which assume that a fair guide to trends in construction costs can be derived solely from fluctuations in wage rates and material prices.

Mr. Harrison first presents a price index number for a composite mile of highway, assuming a fixed quantity of excavation, pavement, gravel surfacing, bridges, culverts, etc. Some figures from this index are shown in Table I. Now the unit price index for highways, the first item in the table, shows decreases below 1923 considerably greater than can be accounted for on the basis of material prices and wage rates of skilled and unskilled workers, as is shown by comparison with the three private

TABLE I

SELECTED CONSTRUCTION COST INDEX DATA

Source and Item	Base period	1923	1929		Lowest point		
			Actual	% Change from 1923	Actual	% Change from 1923	Time
1. *Bureau of Public Roads*— Highway construction							
(a) Price trend—weighted	1925–1929	118	92	−22	59	−50	3d q. 1932
1. Excavation ...		133	90	−32	49	−63	2d q. 1932
2. Pavement		109	93	−15	61	−44	3d q. 1932
3. Structures....		109	95	−13	66	−40	3d q. 1932
(b) Usage trend.....		86	115	+34	..	..	.....
(c) Cost trend.....		100	106	+ 6	..	..	.....
2. *Engineering News-Record*— Heavy construction.....	1913	214	207	− 3	152	−29	June, 1932
3. *Associated Gen'l Contractors*— Construction—all types ..	1913	201	203	+ 1	158	−21	April and May, 1933
4. *American Appraisal Company*— Buildings—all types	1913	212	204	− 4	140	−34	March, April and May, 1933
5. *Aberthaw Company*— Concrete factory building, New England.....	1914	202	191	− 5	165	−18	1st q. 1933

synthetic indices that follow. The different types of work included in the index did not move uniformly. The great lowering of the average price for excavation by 1929 is attributed to the more general use of power machinery; to improvements in the machinery itself; to the use of larger units of machinery; to better management; and to the development of greater skill on the part of working crews.

By 1932, the bid prices probably represented in part competitive conditions under which many contractors made a subnormal allowance for wear and tear on equipment and other items of expense which, over a period of years, must be met. The pavement item shows a more moderate decline, but, at the same time, the public received a better product—a more even surfacing, and greater strength in the pavement.

Structures, chiefly bridges and culverts, represent a much smaller item in the cost of the composite mile. The unit price of structural concrete, with a decline of 8 per cent from 1923 to 1929, and 40 per cent from 1923 to the lowest point of 1932, shows much less effect from technological advances.

Now, the synthetic indices—those of the Engineering News-Record, Associated General Contractors, and the American Appraisal Company —showed very little change in level from 1923 to 1929. For heavy engineering construction, other than buildings, they obviously went seriously out of line, when considered in the light of the Bureau of Public Roads study. It appears that they also failed to reflect field conditions during the period from 1929 to 1933. This conclusion is confirmed by an analysis of bid prices received by several Federal Departments in the autumn of 1930, which showed that synthetic indices had not yet fallen into line with competitive conditions.

For building construction, the rate of technological advance may not be so great as to introduce a serious bias into such indices during a period of a few years. However, the results of studies of increased output per man-hour indicate that technological advance must be a substantial factor over a period of twenty years. The synthetic indices for unit building costs with a 1913 base may have drifted, by 1929, at least 5 to 10 per cent, or even more, too high—a bias which would increase any differential occasioned during the depression by more severe competition among contractors.

The Bureau of Public Roads data show that theoretical perfection is impossible, due to variation in individual conditions. For example, the adjusted average bid price for common excavation in Texas ranged from 18 cents per yard in the first quarter of 1931 to 12 cents in the fourth; whereas, in Pennsylvania the range was from $1.75 to 30 cents. In Texas much of the grading is performed by scraping machines and

does not involve the use of motor trucks and power shovels. Furthermore, the bids for grading allow an extra charge for hauling from cuts to fills more than a couple of hundred feet away. Pennsylvania does not classify its excavation, and the first quarter figure probably represented projects involving costly work, such as rock cuts; furthermore, the Pennsylvania Highway Department makes little use of haulage allowances, and the average haul included under the item of excavation might amount to three or four thousand feet.

These examples indicate that in compiling a construction cost index on the basis of bid prices, either a well-weighted and extensive sample of operations must be represented; or else the most meticulous care must be taken in order to make sure that the scope and character of work included in bids are strictly comparable.

The Interstate Commerce Commission, like the Bureau of Public Roads, has been able to use the former method in compiling an elaborate series of unpublished indices, covering eight geographic zones and based on cost records for 77 grand subdivisions, and 400 or 500 subclasses of work; while the Aberthaw and Turner Construction Companies have approximated the latter method in compiling index numbers—with the qualification that they do not purport to follow a demoralized bidding market to the lowest depth.

There have been tremendous changes in highway engineering, as well as in bridge and culvert construction. Because of such developments, there was computed a usage trend index. This shows that from 1923 to 1929 the number of units of work required per mile increased by 34 per cent. Thus, while unit prices were decreasing by 22 per cent, the average price per mile of highway constructed increased 6 per cent.

Because of the great variations in the quality of buildings, not only individually, but collectively from year to year, it is not possible to derive significant costs per cubic foot or per square foot of floor space from data on contracts awarded which may show both footage and value. Except possibly for short periods, buildings generally have tended to become more highly finished and equipped during the past generation, as witness more complete and elaborate plumbing, heating, and electrical installation, heat insulation and hardwood floors.

Possibly because of this tendency, which increases costs per cubic foot, the industry has not actively rebelled against the synthetic indices. These do not take account of the higher allowable working stresses which reduce the tonnage of materials, wider use of prefabricated materials which require less labor on the job, more effective use of labor-saving equipment, and improved management.

I think that the difficulties of constructing unit price indices for new buildings are not insuperable. Large quantities of certain items, such as electric conduit, heating appliances, masonry walls, steel framing, etc., remain relatively well standardized over a period of years and overlap sufficiently with new developments to permit statisticians to work out not only a unit price index for a representative type of structure, but some sort of quality index, and an actual price index following current practice. Comparisons with trends in leading items of cost to contractors—building material prices and wage rates—would furnish an over-all check on technological advances and other factors affecting output per man-hour.

In studying price relationships, it is well to bear in mind that, in addition to the price of construction, many other factors enter into an owner's calculations about undertaking a new building. These may include, for a property as it stands, the current carrying charges, or perhaps, on the other hand, current net income; the total charges for financing the property during the period of demolition of the existing structure and the erection of a new one, including perhaps separate commissions for a construction loan and for arranging "permanent" financing; and the rate of interest required for permanent financing. A new structure may be cheaper to operate, and more convenient and attractive, bringing in better returns or more personal satisfaction. If the owner contemplates building for his own occupancy, whether or not he already owns the land, the state of the real estate market may influence him. Also various intangible factors may persuade him to rent instead of to own—not to mention the possible alternatives of buying instead of building, or of remodeling an old structure.

From the Census of Construction for 1929 we learn that about three-fourths of the value of construction performed is paid out by contractors and subcontractors for labor and materials, the remainder being accounted for by profits, salaries, interest, surety premiums, depreciation on equipment, etc. In some places, as Boston and the Borough of Manhattan, general contractors and subcontractors are paid less for materials than for wages. In some southern states the cost of materials was more than double the wages paid to labor.

Construction price or cost indices are used for many purposes, such as the following:

(1) Valuation work of various types, such as business appraisals in connection with purchase and sale of properties, and corporation accounting; computation of income taxes, and assessments for property taxes; and valuation for public utility rate-making purposes.

(2) Computation of indices of the physical volume of construction

over past years through application to series showing building permits, contracts awarded, or outlays by public bodies or corporations.

(3) Studies of price relationships, including those between rents, property values, and building costs, business forecasting, and analyses of real estate and building cycles.

(4) Estimates by building contractors and subcontractors for important jobs, particularly those likely to be extended over a period of several months or years, where price changes are a material factor.

Owners and the public generally should know, even if most of them might not use the knowledge wisely, when prices for new construction become greatly above or below the long-time trend. To achieve this constitutes an educative problem which would be largely solved through better indices.

The Federal Government itself is rapidly acquiring a more direct interest in the field of construction on account of its enlarged public works program, its lending operations through the Public Works Administration, the Reconstruction Finance Corporation, the Home Loan Bank System, and the Home Owners' Loan Corporation, etc.

I believe that property owners generally, all the business and professional groups connected with construction and real estate, public utility regulating commissions, and various branches of our local, state, and Federal governments, would find it of great advantage to have accessible a number of indices of prices for new construction of various types for different geographic areas.

If the necessary figures are to be obtained on a nation-wide basis, and to serve the widest usefulness, they should be obtained with the coöperation of local agencies, such as are interested in problems of local business and employment. Their task would be to assure the flowing in of an adequate quantity of actual unit bid prices for various types of engineering construction and buildings, including subcontract work for such items as electric wiring, plumbing installations, and heating. With intelligent handling at a central source, it should be possible to maintain (1) a unit price index, (2) some sort of usage index, and (3) a carefully compiled price-per-cubic-foot index, together with (4) some simply computed series to reflect short-time fluctuations in important elements of cost, principally labor and materials. Such a goal may be distant, but it will do no harm to keep it in view.

CHANGES IN FAMILY INCOME AND RENTAL DURING THE ECONOMIC DEPRESSION

By Edgar Sydenstricker and G. St. J. Perrott

This abstract gives preliminary data on income changes in groups of wage-earning and lower middle class families surveyed early in 1933 by the United States Public Health Service in coöperation with the Milbank Memorial Fund.[1] The primary purpose of the survey was to compare the incidence of illness in 1933 with the economic history of the families during the depression. However, the data obtained on income, employment status, and rental changes between 1929 and 1932 are of interest apart from any bearing on illness. The present report indicates in a preliminary way the type of data available from the survey. Records of 15,000 families in ten localities were obtained; data are here presented on about 8,000 families in five cities—districts in Brooklyn and Manhattan boroughs, New York City, and in Baltimore, Cleveland and Syracuse. The income[2] distribution of the families in 1929 and 1932 is shown in Table I. The five cities have been combined in two groups

TABLE I

DISTRIBUTION OF FAMILIES BY INCOME IN 1929 AND 1932 IN SURVEYED GROUPS IN (1) BALTIMORE, CLEVELAND, AND SYRACUSE AND (2) BOROUGHS OF BROOKLYN AND MANHATTAN, NEW YORK CITY

Annual family income	Percentage of families			
	Baltimore, Cleveland and Syracuse		Brooklyn and Manhattan	
	1929	1932	1929	1932
Under $600	8.6	40.5	5.9	18.8
$ 600–1,199	24.1	35.6	11.1	26.3
$1,200–1,999	39.6	17.8	35.7	33.8
$2,000–2,999	20.4	5.0	29.0	14.9
$3,000–3,999	4.8	0.6	11.2	4.0
$4,000 and over	2.5	0.5	7.1	2.2
All incomes	100.0	100.0	100.0	100.0
Number of families	2,858	2,858	4,978	4,978
Mean income	$1,660	$895	$2,150	$1,440

[1] The reader is referred to Public Health Reports, October 13, 1933 (Reprint 1598) for further details on the method and scope of the survey. The information was obtained by a house-to-house canvass in a single visit to the household. Districts were selected in the poorer sections of the cities, and were neither slums nor homes of the well-to-do. In each district selected, every house was canvassed except in the case of the rather rare direct refusals of information.

[2] The term "income" as used in the present preliminary report includes receipts from wages, rents, interest, and profits, and also the amount of savings or borrowed funds used and the value of a food ticket or other receipts from public or private welfare agencies. The income figures for 1929, when only 4 per cent of the families used savings or borrowed funds, are income in the accepted sense of the word; the figures for 1932, when about 20 per cent of the families augmented their purchasing power by some use of savings or borrowed funds, are more properly labeled "expenditures." This procedure was followed because it was desired to relate incidence of illness to standard of living as

having similar income history (1) Baltimore, Cleveland and Syracuse, and (2) Brooklyn and Manhattan. The average annual family income of the first group was $1,660 in 1929 and $895 in 1932, or a reduction of 46 per cent, while in the Brooklyn-Manhattan group the average income fell from $2,150 in 1929 to $1,440 in 1932, a drop of 33 per cent. The cost of living in these cities, during the same period, had not declined over 20 per cent, indicating a considerable reduction in the purchasing power of both groups.

In 1929, nearly one-third of the group in Baltimore, Cleveland and Syracuse had annual family incomes of $2,000 and over, while in 1932 only 6 per cent remained in this class. Families with incomes of $1,200 and less constituted one-third of the total in 1929 and three-fourths in 1932. In 1929, nearly one-half of the families in the Brooklyn-Manhattan group had incomes of $2,000 and over, while in 1932 about one-

TABLE II

INCOME DISTRIBUTION IN 1932 OF FAMILIES CLASSIFIED IN SIX GROUPS ACCORDING TO 1929 INCOME

Annual family income in 1929	Number of families	Percentage of families in each income group in 1929 which was in the specified group in 1932:						
		Under $600	$600–1,199	$1,200–1,999	$2,000–2,999	$3,000–3,999	$4,000 and over	Total all incomes 1932
I. Families in Baltimore, Cleveland, Syracuse								
Under $600.....	246	83.4	15.4	1.2	0.0	0.0	0.0	100.0
$ 600–1,199.....	689	54.0	41.5	4.1	0.4	0.0	0.0	100.0
$1,200–1,999.....	1,133	37.0	41.1	20.2	1.5	0.2	0.0	100.0
$2,000–2,999.....	583	22.5	32.1	32.7	12.2	0.5	0.0	100.0
$3,000–3,999.....	136	16.9	19.9	31.6	26.5	5.1	0.0	100.0
$4,000 and over...	71	11.3	21.1	19.7	21.1	8.5	18.3	100.0
All incomes 1929..	2,858	40.5	35.6	17.8	5.0	0.6	0.5	100.0
II. Families in Brooklyn and Manhattan								
Under $600.....	296	74.7	18.9	5.4	1.0	0.0	0.0	100.0
$ 600–1,199.....	551	30.3	58.3	10.1	1.3	0.0	0.0	100.0
$1,200–1,999.....	1,775	17.2	30.5	47.8	4.1	0.3	0.1	100.0
$2,000–2,999.....	1,442	11.7	19.6	39.1	27.3	2.0	0.3	100.0
$3,000–3,999.....	560	9.7	15.3	23.9	34.1	15.7	1.3	100.0
$4,000 and over...	354	6.5	6.5	17.5	21.8	20.9	26.8	100.0
All incomes 1929..	4,978	18.8	26.3	33.8	14.9	4.0	2.2	100.0

expressed by expenditures, rather than actual income. The income lowering between 1929 and 1932, therefore, is actually somewhat larger in the sample population than shown by the present data. This inconsistency will be eliminated in the final report.

fifth remained in this class. Families with incomes of $1,200 and less constituted one-sixth of the total in 1929 and nearly one-half in 1932.

Table II shows the correlation between 1929 and 1932 income. Here again, it is seen that the groups in Baltimore, Cleveland, and Syracuse experienced greater reduction in income than the groups in New York City. For example, of the families in Baltimore, Cleveland and Syracuse with incomes between $1,200 and $2,000 in 1929, only 20 per cent remained in that class in 1932, 78 per cent had fallen into lower income groups and only 2 per cent had risen in income. In the same group in Brooklyn and Manhattan, 48 per cent remained in the same income class in 1932, 48 per cent had fallen into lower income groups, and 4 per cent had risen to higher income groups.

A drop in income was experienced by families in both high and low groups but a higher percentage drop was exhibited in the higher income brackets. This is shown in Table III where for the Cleveland and

TABLE III

CHANGE IN AVERAGE INCOME, 1929 TO 1932, OF FAMILIES IN BROOKLYN AND CLEVELAND CLASSIFIED IN THREE GROUPS ACCORDING TO ANNUAL INCOME IN 1929

Annual family income in 1929	Families observed		Mean annual family income for year specified				Percentage drop in income between 1929 and 1932
	Number	Percentage of total	1929	1930	1931	1932	
I. Wage-earning families in Cleveland, Ohio							
Under $1,200	359	34.7	746	676	582	491	34
$1,200–2,000	369	35.6	1,571	1,259	989	767	51
$2,000 and over	307	29.7	2,912	2,316	1,722	1,288	56
All incomes	1,035	100.0	1,683	1,370	1,065	826	51
II. Lower middle-class families in Brooklyn, N. Y.							
Under $1,200	552	14.6	669	736	702	661	1
$1,200–2,000	1,304	34.4	1,611	1,525	1,367	1,185	26
$2,000 and over	1,928	51.0	3,168	2,882	2,414	1,922	39
All incomes	3,784	100.0	2,268	2,102	1,804	1,484	35

Brooklyn groups, the average income from 1929 to 1932 is given for families arranged in three groups by 1929 income. In Cleveland, families with incomes of $2,000 and over in 1929 had in that year a mean income of $2,912; in 1932 these same families had a mean income of $1,288, or a drop of 56 per cent. The group having incomes of $1,200 and less in 1929 had in that year an average income of $746 and in 1932 $491, or a drop of 34 per cent. In the Brooklyn families, the higher group dropped 39 per cent in average income between 1929 and 1932 while the lower group dropped only 1 per cent. This small reduction in mean income in the "under $1,200" group was the net result of loss of

income by some families and an increase above $1,200 in the case of other families.

Rentals paid in 1933 were lower than in 1929 but the lowering was less than the drop in income. For example, in Brooklyn the median rental was $39.50 in 1929 and $28 in 1933, or a drop of 19 per cent; in Cleveland median rental dropped from $25 to $17, or 32 per cent; in Baltimore the median rental dropped from $21.50 to $17.50, or 19 per cent. The median values of owned homes in 1929 were $9,400, $5,600, and $2,600 in Brooklyn, Cleveland and Baltimore, respectively; in 1932 the figures were $8,100, $4,000 and $1,900, or drops in valuation of 14, 29 and 27 per cent, respectively.

A definite relation between income and rental distributions was found in the surveyed groups but the relation varied from one locality to another. For example, if the distribution of families by income and by rental in 1929 is compared,[1] it is found that in Brooklyn 54 per cent of the *renters* had annual incomes of less than $2,000 and an equal per cent paid monthly rentals less than $35. In Cleveland, 74 per cent of the renters had incomes less than $2,000 in 1929 and an equal per cent paid monthly rentals less than $31.50. About 30 per cent of the *owners* in Brooklyn had incomes less than $2,000 and 62 per cent of the owners in Cleveland were in this income class in 1929; the corresponding values of homes for families receiving less than $2,000 annual income were $8,000 in Brooklyn and $6,500 in Cleveland. Relations of this sort obtained from rental and income distributions of sample populations might be used for calculation of income distribution from the census data on rentals and values of owned homes, if the average relation between rental and income distribution were known. However, the percentage of income which a family pays for shelter varies with the income of the family and with the type of family and community, and hence rental-income data from small sample populations must be used with caution in predicting income distribution from the census data on rentals. Because existing data are scanty, it is felt that the records of the relatively large sample populations of the present survey will be worth careful analysis.

Estimation of the meaning of the results in terms of the whole urban population of the country must await complete analysis of the entire body of data collected.

[1] This method of correlation was suggested to one of us (G. S. P.) by Dr. Maurice Leven of the Brookings Institution.

THE ECONOMIC DEPRESSION AND SICKNESS[1]

By Selwyn D. Collins and G. St. J. Perrott

During the recent years of severe economic depression, the total death rate and infant and tuberculosis mortality in the general population have declined to the lowest figures on record. Neither mortality nor morbidity data are available for that specific portion of the population that has suffered from unemployment. Even in the worst depression, the families of the unemployed are a minority and the trend of mortality in the total population does not necessarily reflect the trend in these severely affected households.

The assumption that *mortality* in the general population is an accurate index of *sickness* in the families of the unemployed is still less tenable. Recent morbidity studies[2] have shown that the important causes of death are *not* the most frequent causes of illness. The number of illnesses severe enough to be remembered and reported, even in relatively infrequent canvasses of households, is more than 100 times the number of deaths. For digestive, respiratory, eye, ear, and skin conditions and the common communicable diseases of childhood, the disparity between sicknesses and deaths is even greater. In depending upon deaths to indicate trends in health we are relying on a small and probably biased sample of the cases of illness. The desirability of checking up on *all* illnesses before drawing conclusions from data based only on the *fatal* cases seems apparent.

To obtain data on sickness among those elements of the population that have borne the brunt of the depression, the United States Public Health Service and the Milbank Memorial Fund undertook a special house-to-house canvass of severely affected districts in 10 localities. No attempt was made to select sections that would be representative of the city as a whole, only the poorer districts being canvassed. Slum areas were not included because they would contain too many families who had never, even at the height of prosperity, been self-supporting. Well-to-do sections were omitted as being still above a standard of living that could affect health adversely, even though great decreases in income had taken place. Colored sections were excluded to avoid the question of racial differences in employment, income and sickness. In the blocks or

[1] A preliminary report based on surveys in 8 cities—Baltimore, Birmingham, Cleveland, Detroit, Greenville, S. C., New York, Pittsburgh, and Syracuse. From the Office of Statistical Investigations, United States Public Health Service and the Division of Research, Milbank Memorial Fund.

[2] Hagerstown Morbidity Studies, Reprints 989 and 1167 from the Public Health Reports for February 13, 1925, and June 14, 1927, respectively. Morbidity in 18 States, Reprint 1563 from the Public Health Reports for March 24, 1933, and Publication No. 27 of the Committee on the Costs of Medical Care, University of Chicago Press, 1933.

streets that were surveyed, every white family was covered, whether employed or unemployed and whether recently poor or never self-supporting. Those families whose breadwinners still had their jobs were to serve an important rôle in the study, viz., a control group whose illness rate would be a yardstick which would be essential in interpreting the illness rates found for those who had suffered economic reverses.

Previous experience in sickness surveys indicates that a single interview of a housewife will not yield a reasonably complete record of illness for a longer period than about three months. Even for this period, one cannot expect to get all of the many minor respiratory and digestive conditions that caused no disability but that would be reported as illness if visits were made at weekly or semi-monthly intervals. With this limitation on the illness record that could be secured, the problem was to plan a survey, with only one visit to the households, that would nevertheless afford more than a comparison of illness rates among poor and comfortable or among employed and unemployed at or immediately preceding the time of the canvass. A feasible method seemed to be to obtain for each member of the family (1) a record of illness and medical care for the three months preceding the date of the canvass,[1] and (2) a record of occupation, wages earned, and regularity of employment for each year from 1929 to 1932 of sufficient detail to compute the family income. These data enable us to relate current illness to *changes* in income during the depression as well as to present economic and employment status. The accuracy of the 4-year income record may be doubted but this was a period of such tremendous changes in economic well-being that small errors did not interfere with a reasonably good classification of the families according to income change since 1929.

Income per capita is used as the measure of well-being of the family. In 1929, 12 per cent of the persons surveyed were in families with an annual per capita income of $149 or less; by 1932, 46 per cent of the individuals were in this class. On the other side of the picture, 39 per cent of the persons were in families with an annual per capita income of $425 or more in 1929 but by 1932 this figure had decreased to 12 per cent.

Inquiry was made about illness from all diseases and accidents, including mild as well as severe cases. In the present paper only the disabling cases are considered, this category including all cases that involved loss of time from work, school or other usual activities, whether or not the individual was gainfully employed. Seventy-five to 90 per cent of the disabling cases were also in bed for one or more days.[2]

Sickness and unemployment. Considering first the sickness rates ac-

[1] Dates of the canvasses varied from March 20 to May 15, 1933.

[2] Further details on the method and scope of the study may be found in a preceding report, Public Health Reports, October 13, 1933 (Reprint 1598)

cording to the employment status of wage-earning members of the family at the time of the survey, the results are indicated in Chart I. Those families who had no employed workers or only part-time workers had a disabling illness rate for cases with onset within the 3-month period of 114 per 1,000 as compared with 88 per 1,000 among families who had full-time workers in the family. In the various age groups, persons in the families of the unemployed suffered more sickness than those in the families of the employed, both as to cases with onset within the 3-month period and cases (largely chronic) that had their onset prior to the period of the study.

CHART I

DISABLING ILLNESS AT SPECIFIC AGES IN 8 SURVEYED CITIES IN FAMILIES CLASSIFIED ACCORDING TO THE EMPLOYMENT STATUS OF THE WAGE-EARNERS

(Data for all ages:—Unemployed or part-time: onset within =114 per 1,000; onset prior =52 per 1,000; population =17,938. Full-time: onset within =88 per 1,000; onset prior =41 per 1,000; population =15,709. Excludes 54 persons of unknown age.)

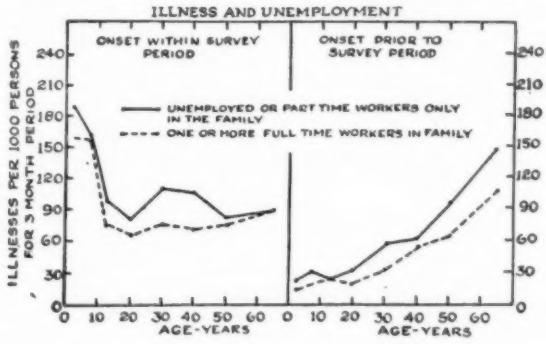
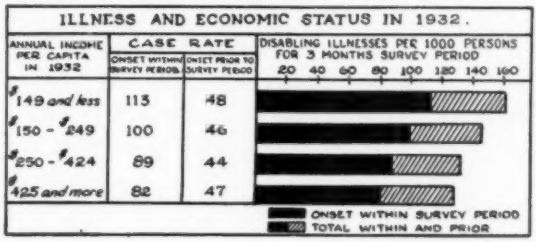

ILLNESS AND UNEMPLOYMENT
ONSET WITHIN SURVEY PERIOD
ONSET PRIOR TO SURVEY PERIOD
ILLNESSES PER 1000 PERSONS FOR 3 MONTH PERIOD
UNEMPLOYED OR PART TIME WORKERS ONLY IN THE FAMILY
ONE OR MORE FULL TIME WORKERS IN FAMILY
0 30 60 90 120 150 180 210 240
0 10 20 30 40 50 60
AGE-YEARS

CHART II

DISABLING ILLNESS DURING A 3-MONTH PERIOD IN THE EARLY SPRING OF 1933 IN WAGE-EARNING FAMILIES CLASSIFIED ACCORDING TO INCOME PER CAPITA IN 1932, IN 8 CITIES

(Number of persons observed: $149 and less =15,495; $150–249 =7,852; $250–424 =6,355; $425 and more =3,999.)


ILLNESS AND ECONOMIC STATUS IN 1932.
ANNUAL INCOME PER CAPITA IN 1932
CASE RATE
ONSET WITHIN SURVEY PERIOD
ONSET PRIOR TO SURVEY PERIOD
DISABLING ILLNESSES PER 1000 PERSONS FOR 3 MONTHS SURVEY PERIOD
20 40 60 80 100 120 140 160
$149 and less 113 48
$150 - $249 100 46
$250 - $424 89 44
$425 and more 82 47
ONSET WITHIN SURVEY PERIOD
TOTAL WITHIN AND PRIOR

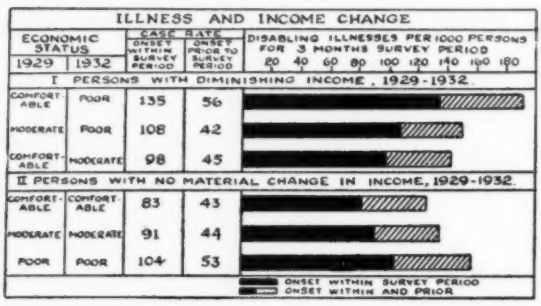
Sickness and income in 1932. Illness rates were computed for families classified according to per capita income in 1932, immediately preceding the period in 1933 for which sickness was recorded. The results are shown in Chart II. For illnesses with their onset within the 3-month period, there is a regular progression from 82 disabling cases per 1,000 persons in the highest income group to 113 per 1,000 for those families with the lowest incomes.

Sickness and income change. It is of interest to separate those families who were poor even in prosperous times—the "chronic poor"—from those who have become poor since 1929—the "depression poor."

CHART III

DISABLING ILLNESS IN WAGE-EARNING FAMILIES CLASSIFIED ACCORDING TO CHANGE IN ECONOMIC STATUS, 1929–1932, IN 8 SURVEYED CITIES

(Number of persons observed: Comfortable-poor = 2,757; moderate-poor = 9,071; comfortable-moderate = 6,690; comfortable-comfortable = 3,733; moderate-moderate = 7,140; poor-poor = 3,649. Excludes 607 persons with higher incomes in 1932 than in 1929 and 54 persons of unknown age.)*



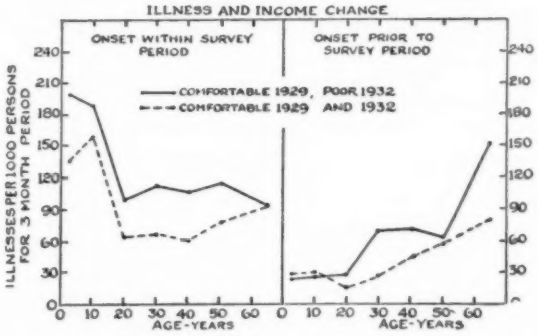
*Comfortable = $425 and over per capita per year. Moderate = $150–424 per capita per year. Poor = $149 and less per capita per year.

The results for all ages are shown in Chart III. Considering cases with onset within the 3-month period, the group whose economic status fell from comfortable in 1929 ($425 per capita per year) to poor in 1932 ($149 or less) had the highest sickness rate, 135 cases per 1,000 persons, as against 83 per 1,000 for those who remained in the comfortable class throughout the four years. Those who were poor ($149 or less) all four years reported illnesses that amounted to a rate of 104 per 1,000 or considerably less than those who had fallen from comfortable to poor within the four years. The rates for the intermediate classes with moderate income fall logically between the figures quoted above. Briefly, the highest sickness rates are associated with the greatest decreases in per capita income during the depression. The association with per capita

income as it existed at the time of the survey is of a lesser order than the association with the fall in income.

CHART IV

DISABLING ILLNESS AT SPECIFIC AGES IN 8 SURVEYED CITIES IN TWO GROUPS OF WAGE-EARNING FAMILIES, ONE WHICH SUFFERED A LARGE DECREASE IN INCOME BETWEEN 1929 AND 1932 (COMFORTABLE 1929, POOR 1932) AND THE OTHER WHICH MAINTAINED UNCHANGED INCOME (COMFORTABLE 1929 AND 1932) *



*Comfortable=$425 and over per capita per year. Poor=$149 and less per capita per year.

Chart IV indicates that among the families whose incomes suffered the greatest decreases since 1929 the high sickness rates prevail in the several age groups throughout life.

As yet the diagnoses of the illnesses have not been fully tabulated but we can say that both respiratory and non-respiratory illness rates show the same general picture among adults and with the exception of the communicable diseases the picture is also true for children under 15 years of age.

In all of these various analyses the chief differences in sickness rates appear for illnesses with their onset within the 3-month survey period. Illnesses (chiefly chronic) that had their onset prior to the 3-month period show little or no relationship to income or income change.

To summarize, families containing only unemployed or part-time workers show a higher incidence of disabling illness than those with a full-time worker. Families with low per capita income in 1932 show higher rates than those in the higher income classes. Illness is highest among the "depression poor" who were in reasonably comfortable circumstances in 1929 but had dropped to comparative poverty by 1932. Their rate is considerably higher than that of their more fortunate neighbors who suffered no material drop in income and somewhat higher than the rate for the "chronic poor" who were in poverty even in 1929.

PROBLEMS IN THE APPLICATION OF CORRELATION TO SOCIOLOGY

By Samuel A. Stouffer

Sociologists are gradually discovering that there is rather little place for simple correlation between two variables in their field. As Frank A. Ross said, in a searching paper read at Cincinnati last winter, a sociological problem seldom involves a simple relationship between A and B, but usually involves a relationship between A, B, C, D, and other factors.[1] When this lesson is learned, the first forward step toward a sound statistical analysis has been taken. The second step involves the consideration of how to separate the effects of the several factors involved in the problem. In discussing this second step, we shall not hesitate to say things which may be painfully obvious to the expert statistician, or to use non-technical language, now and then, at the expense of the nicest mathematical precision.

In general, there are three methods of separating the effects of several factors. First, the *direct* method of classification into subgroups, which always is preferable if the data are sufficient, and for which are available tests of significance, such as provided by R. A. Fisher's analysis of variance if the dependent factor is on a quantitative scale, or by the Chi-square test or kindred methods if the dependent factor is expressed in the form of attributes. Second, the *indirect* method of partial correlation. Third, a combination of the direct and indirect methods.

When any of these three procedures is followed in sociology, one often finds that the apparent influence of a single factor is rather small. This usually means that a finding is subject to too large a chance fluctuation to be regarded as more than a mere tendency. Nevertheless, a mere tendency may be important. For example, W. F. Ogburn discovered by partial correlation a slight tendency—very slight, but too large to be reasonably attributed to chance—for the birth rate to be lower in American cities where there was more early marriage than in cities where there was less early marriage, suggesting that the knowledge of birth control encouraged early marriage.[2] Sociologists need not be discouraged because relationships are generally not high, but we must remember that this fact requires even more caution than is necessary in fields of research where knowledge of one or more factors

[1] Frank A. Ross, "The use of Statistical Data and Techniques in Sociology," Chapter XV in L. L. Bernard (ed.), *The Fields and Methods of Sociology*.

[2] E. R. Groves and W. F. Ogburn, *American Marriage and Family Relationships*, Chapter XVI.

yields rather complete understanding of the dependent variable. Let us enumerate briefly a few problems.

1. *The measures or indexes used in a study may be of varying reliability or validity.* By reliability is meant, Does the index measure *something* consistently? By validity is meant, Granted that the index measures something consistently, is it really describing what we think it is describing? W. F. Ogburn and Nell Talbot made an interesting statistical analysis of the 1928 presidential election.[1] They sought the net relationships between Smith's vote in certain counties and indexes of wetness, Catholicism, urbanization, and other factors. Now the value of the partial correlation between the index of wetness of a county and Smith's vote depends not only on the accuracy of the index of wetness but also on the accuracy of the other indexes. If the factor of wetness is unreliably measured and the factor of Catholicism is reliably measured, the partial correlation found between Smith's vote and wetness ordinarily would be too low, and the partial correlation found between Smith's vote and Catholicism would be too high. Granted, however, that the indexes are measuring something reliably, ultimate interpretation depends on what meaning is given to the indexes, that is, on their validity. The index of Catholicism taken was the percentage of Catholics in the county. Since the partial correlation was positive, it appeared that an increase in the percentage of Catholics from county to county, other factors being equal, was associated with an increase in the percentage of votes received by Smith from county to county. But is a large percentage of Catholics in a county an index of pro-Catholic sentiment, and a small percentage of Catholics an index of anti-Catholic sentiment? Is it not quite possible, at least in the northern states, that there is as strong anti-Catholic sentiment in some counties in which Catholics and non-Catholics are in equal numbers and in conscious competition, as in some other counties which have few Catholics? The danger lies in the necessity for succinct summary—a reader, if not an author, is apt to read too much into the figures.

Another aspect of the problem just discussed, is the varying reliability or validity of a particular index in different segments of a single study. Henry D. Sheldon, Jr., in a study of juvenile delinquency in Cleveland soon to be published, found that unemployment was a useful index of economic conditions in certain census tracts of the city but was quite unsatisfactory in other tracts; while other single economic indexes, such as median rental, percentage of homes renting for a given

[1] W. F. Ogburn and Nell S. Talbot, "A Measurement of the Factors in the Presidential Election of 1928," *Social Forces*, VIII, 175–83.

figure or less, dependency, or home ownership, were equally spotted in the generality of their applicability.

Still another situation is interesting—that in which a variable is inaccurately measured, but in which the error may be considered constant. Sanford Winston studied the relationship between illiteracy and several other social factors.[1] Now, if it is true that the number of illiterates omitted bore a constant proportion to the number enumerated, the correlation coefficients will be unaltered by the error. But this is not true with the regression equation. Winston projected his regression plane to estimate under what conditions illiteracy might be expected to reach zero. Such a projection is a brave *tour de force* under any circumstances, but the fact, if true, that the size of the error in reporting illiteracy is in constant proportion to the number enumerated, would likely alter his conclusion. On the other hand, if, as is more likely, the number of illiterates omitted is not in constant proportion to the number enumerated, the partial correlation coefficients themselves are subject to error—in this case, they are possibly too low.

2. *Usually, sociological studies fall considerably short of explaining all the variation in the factor for which we are trying to account.* This would not introduce serious difficulties if we could assume that the unmeasured factors were not associated with the independent variables which we have measured. Usually, we cannot assume this. Ogburn and Talbot, in studying Smith's vote, were, of course, unable to measure the importance of Hoover's promise to abolish poverty and put a chicken in every pot. It is quite possible that the relative importance of wetness as an issue might have been considerably altered in their final results, if an index of the effect of the prosperity issue could have been devised. Another example: In studying juvenile delinquency, by finding the relationship between various factors and delinquency in census tracts, it is almost impossible to measure the rôle of what Thrasher calls "interstitial areas," near railroad yards, coal dumps, etc., where boys' gangs are thought to thrive. If it were possible to measure the "interstitiality" of an area, we might considerably lower the partial correlation between delinquency and the percentage of foreign born and Negroes, since these "interstitial" areas are thought to have a considerable percentage of foreign born and Negroes.

If we cannot get measures of missing factors, what is the way out? The writer sees no way out at present, except watchful caution in interpreting results. But suppose we can get measures of several additional factors? We are likely to find ourselves with a problem requiring the correlation of a half a dozen factors, and it is an open

[1] Sanford Winston, *Illiteracy in the United States.*

question whether the resulting complication is not too much for us. Some studies in rural sociology and economics have used as high as 14 or 15 variables. One is inclined to suspect that this is verging toward absurdity. Are our minds big enough to grasp the significance of so many intricate interrelations?

3. *Partial correlation is likely to "partial out" elements in such a way as to remove much of the commonly understood meaning from a particular index.* In the study of Smith's vote, what is the meaning of an index of urbanization (i.e., percentage of people in a county who live in cities) when indexes of wetness, Catholicism, foreign born, etc. are "held constant?" Ogburn and Talbot's study found a slight negative relationship in this case; that is, the larger the percentage urban in a county, the smaller Smith's share in the vote, other factors constant. At first glance, this seems incredible, since one of the issues in the campaign was supposed to be Main Street vs. the Sidewalks of New York. But the correlation simply means that if all counties had the same indexes of wetness, Catholicism, foreign born, etc., Smith would have received slightly less support in the counties with a comparatively large urban population than in counties with a comparatively small urban population. It does not mean that "urbanization," as the term is commonly understood, and Smith's vote were negatively associated. The term "urbanization" as commonly understood involved something more than the mere proportion of people in a county, living in a city; it involves a complex of sociological and psychological factors, including some of the very elements which are partialled out by indexes of wetness, Catholicism, and foreign born. In other words, the simple correlation between Smith's vote and percentage urban actually may show the relationship between Smith's vote and so-called urbanization more adequately than does the partial correlation. The partial correlation may have been valid, but it is easy for the reader to read "urbanization" into these findings, in spite of the authors' cautions.

A special problem arises when it is desired to use two measures of the same factor in a partial correlation analysis. Suppose that one has available two indexes of economic status in census tracts of a city, neither of which is ideal, but some combination of which is better than the use of either index to the exclusion of the other. If one measures the relationship between juvenile delinquency, let us say, and one index of economic status, holding "constant" the percentage of foreign born and Negroes and the other economic index, such a partial correlation is practically devoid of meaning. A procedure is needed for measuring the combined correlation between juvenile delinquency and the two economic indexes, holding percentage of foreign born and Negro con-

stant. The writer has proposed a simple device which, it is hoped, may help to accomplish this result.[1]

4. *Even if the indexes are reliable and valid throughout the range of the data, a rectilinear correlation system may obscure important variations in relationship in different regions of the data.* Suppose that we divide the census tracts of a city into four groups, according to the percentage of home ownership. We may find that within Groups I and II a partial correlation between juvenile delinquency and the percentage of foreign born and Negroes is high, holding the other factors constant; while within Groups III and IV the partial correlation may be low. This difference may be very important; yet it would be averaged out if all the data were analyzed in a single correlation scheme. Indeed, one suspects that a difference of this kind is likely to be the rule rather than the exception in sociological studies. The reason for this suspicion is that so many sociological scatter diagrams are non-linear. The non-linearity frequently may be handled conveniently by using logarithms, but often a more illuminating attack is to break the data into sub-groups and analyze each sub-group separately by a partial correlation scheme, if the data are sufficiently numerous, as they usually are not.

5. *Lastly, there is as yet no agreement on how to evaluate the so-called "relative importance" of two factors in their net association with the dependent variable.* It is largely a matter of defining "relative importance." Perhaps, as a matter of common sense, we are interested in relative importance in somewhat the same way as is the grain speculator, who is considering wheat futures and wants to know whether to give more weight to a drought in Kansas in one month than in another month. Unfortunately, among the various correlational procedures for evaluating relative importance, there is none which has a simple meaning readily communicable to the lay reader if defined with mathematical exactness. We can speak precisely and not be understood by our general audience, or we can speak inexactly, with the result that another sociologist can make a different set of conclusions based on apparently the same assumptions.

Suppose that the partial correlation between juvenile delinquency and percentage of foreign born and Negroes is .20 while that between juvenile delinquency and economic status is .40. Now we are really interested in accounting for the variability in delinquency—that is, we want to know why some areas have so many juvenile delinquents and why some have so few. If we could account for all of the net variability in juvenile delinquency by our knowledge of foreign born and

[1] "A Coefficient of Combined Partial Correlation with an Example from Sociological Data," the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION, March, 1934.

Negroes, holding economic status "constant," our partial correlation would be unity. However, we can account for only a part of the net variability this way. The question is, What proportion can we account for, and how does this compare with the proportion which we can account for by our knowledge of economic status, holding foreign born and Negroes constant?

We can make a variety of answers, depending, first, on how we choose to measure the variability. If we measure the variability by the variance, the average squared deviations from the mean, the square of a partial correlation coefficient has been interpreted as telling what proportion of the net variance in juvenile delinquency is accounted for by one factor, holding another factor constant. By comparing the squares of the two partial correlation coefficients, .20 and .40, we say that their relative importance is as .04 to .16 and that one factor is four times as important as the other. But we have based this conclusion on the arbitrary choice of the variance as the measure of variability. It is perhaps just as reasonable to use, instead, the standard deviation. However, if we use the standard deviation as a basis, we have at least two choices. (a) If r^2 is the proportion of the net variance of Y associated with X, then there is some justification for saying that r is the proportion of the net standard deviation of Y associated with X. We now compare .20 and .40 and have one factor only twice as important as the other. (b) If r^2 is the proportion of the net variance of Y associated with X, then $1-r^2$ is the proportion *not* associated with X. It follows that $\sqrt{1-r^2}$ is the proportion of the net standard deviation of Y not associated with X. Now note: If $\sqrt{1-r^2}$ is the proportion of the net standard deviation of Y which is not associated with X, the proportion which is associated with X must be $1-\sqrt{1-r^2}$. If we adopt this as our measure of importance we find that one factor is now 4.1 times as important as another. A modification of these approaches is to compute the value β^2, which is the square of the partial regression coefficient when all the variables are expressed in standard deviation units. β^2 is taken as the measure of the so-called importance of the factor considered, and a comparison of the two values of β^2 provides a measure of relative importance. Instead of using β^2, however, there is some justification for preferring a value based on the product $\beta \times r$, where r is the simple correlation coefficient between the dependent variable and independent variable considered. We shall get a different numerical result, depending on the procedure used.

Still another approach to an evaluation of the relative importance of two factors is by considering not variability, but simply slope itself. The comparison may be of two values of b, the partial regression coeffi-

cient, if the units are strictly comparable; or else of the two values of β, the transformed b.

The point of our foregoing illustrations is that the interpretation which we make as to the relative importance of two factors depends entirely on which of these seven methods (there are still others) we select for measuring the importance. Some statisticians prefer one device, some prefer another; and the writer knows at least one mathematical statistician who believes that all of the attempts to compare the relative importance of two factors are fallacious. Perhaps, indeed, the problem itself is a false lead. The writer knows nothing about chemistry, but doubts whether a chemist would see any point to the question, Which is more important in forming water—oxygen or hydrogen? The fact that there are two parts hydrogen to one part oxygen hardly can mean that hydrogen is twice as important. Yet, somehow, one still has the feeling that the wheat speculator in weighing the relative importance of drought in two different months, or the sociologist, in trying to discover whether a raising of economic status is ultimately more important than a reduction of foreign born in coping with juvenile delinquency, is asking a legitimate question.

Many other important problems might be raised. Particularly, the writer would like to call attention to difficulties in evaluating the sampling errors when correlation data used are areas contiguous in space or points successive in time. Nothing has been said as to the variety of results obtained depending on the size of area when the study has a geographical base. Nor has anything been said here about the treatment of qualitative factors.

This discussion has emphasized difficulties in the application of partial correlation in sociology and necessarily has skimped consideration of the positive values of the method. Indeed, there is yet to be demonstrated an adequate substitute when data are limited. To older and wiser heads some of the apparent difficulties discussed may not be difficulties at all. We who are less experienced statisticians will earnestly appreciate the guidance which can be given in helping us to make the practical application of partial correlation in sociology as logically and aesthetically satisfying as the beautiful mathematical concept itself.

THE INADEQUACY OF CORRELATION METHOD IN GENETIC RESEARCH

By Barkev Sanders

Despite the progress of experimental biology, the relative importance of nature and nurture presents a wide diversity of views. On the one extreme there are those, such as Watson ('27), who minimize the rôle of nature; in the midground is a large group of biologists, such as Jennings ('30) or Conklin ('31), who attribute a prominent rôle to nurture; and at the other extreme are the followers of Galton and Pearson who emphasize the preponderance of nature.

In a recent study I have tried to show the inadequacy of correlation method for evaluating the relative potency of nature and nurture. The critical problem in my study is the reinterpretation of correlation coefficients, obtained by Pearson and his associates, to show that they do not indicate that nature is five to ten times as potent as nurture, as contended by Pearson, but that they show the complete ineffectiveness of nurture, and the complete determinism of nature. A study of the coefficients obtained by Pearson and his associates, between ontogenetic traits, such as stature, eye color, vivacity and conscientiousness, shows that the coefficients for parents and offspring and for offspring *inter se* cluster closely around a mean of .51. The coefficients between ontogenetic traits and environmental factors, such as wages, maternal employment, and housing show a wide scatter within the range of $-.14$ to $+.16$ (Elderton and Pearson, '15). The first set of coefficients is believed to be the result of heredity; the second set may be due to the indirect effect of heredity as both Pearson and Elderton have suggested. On the basis of Pearson's causal interpretation, it is more in keeping with the facts to conclude the ineffectiveness of environment, rather than its being one-fifth or one-tenth as important as nature, especially since Pearson has shown that the low correlation between ontogenetic traits and environment cannot be increased significantly by increasing the number of environmental variables correlated with a given trait.

Turning to the effect of nature, according to Pearson, the multiple R between the traits of offspring and that of parents and grandparents is .71. It would seem that there is a measure of indeterminism in ontogenetic development, since a coefficient of .71 indicates that heredity accounts for 50 per cent of the traits in offspring. In the light of modern genetics however, we learn that in a heterozygote population the correlation method, being based entirely on phenotypic resemblance, cannot

account fully for recessive traits. If allowance could be made for this limitation, the coefficients obtained between the traits of parents and offspring would approximate 1, thus complementing the evidence showing the ineffectiveness of nurture by evidence showing the complete determinism of nature. That this assumption is essentially correct is substantiated by two lines of evidence. First, the evidence from correlation studies of identical twins, which give coefficients of a magnitude of .95 (Stocks '30), is surprisingly close to 1 when corrected for attenuation. But, even in identical twins there are minute differences in finger prints, pigmentation and the like, which, in the Pearsonian sense, could not be regarded as environmental. Therefore, even in identical twins the contribution of nature, as measured by correlation coefficients, is minimized rather than otherwise. The second line of evidence is to be found in the words of Pearson ('11):

> Now suppose the resemblance between these two types of qualities [characters attributed to nature and those attributed to nurture] shows no differentiation, beyond the probable errors of our samples, and the observation errors of our estimates. . . . Why, the probability that the two series are both due to heredity and not one to nature and one to nurture, becomes so great that we say that the proof that it is nurture which is giving substantially the same value as nature in these cases must fall on those who assert that nurture makes two brothers resemble each other in shyness to the same extent as nature makes these two brothers resemble each other in the shape of their heads or the length of their forearms. (pp. 9–10)

That is, if one concedes that characteristics such as eye and hair color are not affected by environment, then one must concede that other traits such as stature, intelligence and the like are likewise independent of environment, since the magnitude of the correlation coefficients between these two classes of traits in blood relatives is the same.

Assuming that my reinterpretation of correlation results is essentially correct, it would be easy to demonstrate the worthlessness of the method for evaluating the importance of nature and nurture; since deductions derived from correlation coefficients are contradictory to a vast volume of experimental and clinical evidence. In my study—*Environment and Growth*—I have attempted to demonstrate this very fact by an analysis and coördination of available evidence showing a differential development in height and weight in members of different socio-economic classes, which is produced largely by the differential socio-economic environment characterizing these classes.

Even if it could be shown that my reinterpretation of correlation results is at fault, there is still an urgent need to reëvaluate, in the light of modern theory of statistics and genetic science, the validity of the corre-

lation method in genetic investigations. The correlation method was discovered by Galton in connection with his researches intended to show the greater importance of nature over nurture. The results obtained from correlation studies were interpreted to demonstrate the Law of Ancestral Inheritance. According to this law, two parents contributed on the average one-half of the traits of the offspring, the four grandparents one-quarter, the eight great-grandparents one-eighth, and so on forming a geometrical progression. The characteristics of offspring were a blend of the corresponding characteristics of parents. No distinction was made between genotype and phenotype; all variations were believed to be continuous and in conformity with the normal curve of error; and all variations were believed to be hereditarily transmissible, heredity being defined in terms of somatic resemblance between offspring and its progenitors. With the rediscovery of the work of Mendel, the Law of Ancestral Heredity was relegated to history. Subsequent genetic research has shown that characteristics of offspring are not usually blends of the same characteristics of the two parents, and that almost all instances of apparent blending lend themselves to the Mendelian scheme of inheritance on the basis of multiple factor theory. It has been shown that one parent may contribute one characteristic and the other, another characteristic. It has been demonstrated that two organisms may be phenotypically the same and still differ vastly in their genetic potentialities—giving birth to offspring widely dissimilar. It has been shown that heredity is not limited to resemblance, and conversely, that not all resemblances are hereditary. There is evidence that not all variations are continuous, nor in conformity with the normal curve of error, and not all of them are hereditary. These discoveries have demolished the logical basis on which correlation coefficients were invested with genetic significance, and if the method is to remain in use a new basis must be found for it.

A restatement of the logic underlying the correlation method in genetics is further necessitated by changes in the theory of correlation itself. In its heyday, correlation and causation were assumed to be synonymous. It was only with bitter experience that the presence of spurious correlation was admitted, and the expression "correlation does not mean causation" came to be an aphorism. These changes, however, have not disturbed the calm of those who are still endeavoring to determine, by means of correlation, the importance of nature and nurture. It may be added that not only does correlation not mean causation, but that a lack of correlation does not mean absence of causation, or that causation does not necessarily mean correlation. This can be easily demonstrated in the realm of chemical phenomena.

Assuming, however, that my criticism of the correlation method in genetic research could be sustained; it may be of some interest to consider broadly the conditions which invalidate the method.

The deduction of causation from correlation is based on a crude logic which had certain heuristic value at the commencement of the scientific era when the phenomena dealt with were relatively simple—falling in the realm of what the physicists now call six feet physics. According to this logic heredity is entity X and the environment, entity E. If a given E does not produce the same effect on X as on X_1, then it cannot be considered as responsible for the difference observed between the complex XE and X_1E. We know that this logic falls down in many realms of phenomena, particularly in that of a chemical nature. There is evidence that in a measure organic phenomena simulate chemical phenomena. In fact, geneticists believe that genes, the hypothetical building stones of heredity, are complex organic molecules endowed with powers of growth and enzyme-like properties. Pharmacodynamic effects of drugs provide numerous instances exemplifying the somewhat unique susceptibility of each organism, simulating chemical specificity and noncontinuity. Moreover, there is a growing volume of genetic evidence which shows that ontogenetic effects may depend on specific environmental conditions as well as on specific germinal makeup. For example, in the *drosophila melanogaster* a certain mutant type if raised on moist fresh food shows an abdominal deformity, which can be obviated by raising these flies on dry food; with other flies, moist fresh food produces no such deformity. To assume that the abdominal deformity is genetical is to overlook the fact that we may alter its expression without changing the genetic makeup. To assume that it is environmental is just as false, because we may eliminate the deformity by altering the genetic makeup. It is apparent that we are dealing with a phenomenon that defies our simplistic cause and effect notion, and therefore, cannot be unentangled by the correlation method. The genetic complex and environment react in a way simulating a chemical reaction. In our present ignorance, we are unable to determine the extent of this uniqueness, but that there is a certain measure of uniqueness is undeniable and to the extent that this is true, to that extent the correlation method is ineffective to determine causation.

In instances where one has identical genetic makeup, such as identical twins, one cannot be certain that what appears to be a dissimilar environment, superficially, is in reality so. Assuming a certain specificity of the genetic complex, it would be natural to assume that genetically like organisms would normally tend to respond to like environmental elements, unless one were expert enough to eliminate likeness of environment. The

apparently greater specificity of the germinal complex may be due, in part, to our ignorance of genetic differentials, and in part to our ignorance of what may constitute the significant differential factors in a given environment. It is obvious that before the discovery of the atomic theory, if one tried to establish causation in the realm of chemistry according to the tenets of correlation method, one would have gained no significant success. Substances appearing essentially similar, when combined would have given dissimilar results, while other substances appearing highly dissimilar may have resulted in like compounds. Therefore, what may appear as non-specificity in environment may be due to our ignorance to identify the truly differential factors. Even if one were to admit a certain measure of non-specificity in environment, that will not justify the conclusion of genetic determinism in ontogenetic development, even though such non-specificity, under ordinary conditions, will tend to obscure the apparent correlation between specific environmental factors and organic characteristics. More intensive studies in genetics have revealed that often diverse gene complexes may be responsible for somatologically identical characteristics, indicating a measure of apparent non-specificity in the genetic complex. The oversight of this genetic non-specificity may also tend to obscure the apparent environmental effect in development. Before leaving the problem of identical twins, it may be remarked that the six or seven pairs of identical twins, separated in early infancy, who have been studied intensively show variable results. Some show surprising intellectual similarity but differences in temperament; others, a similarity in temperament but marked intellectual differences, indicating that at the present state of our knowledge we cannot generalize the measure in which a given genetic complex may be altered by environmental circumstances. The same organic trait may be responsive to a given environment in one individual and not so in another, indicating the unsuitability of correlation method.

In correlation studies the time variable is generally left out of consideration, this would tend to minimize the apparent association between environment and developmental traits. Even if effort were made to take the time element into consideration, the practical difficulties and the limitation of the correlation technique would render this impossible. In this connection it should be emphasized that organic processes are not like the successive throws of dice, where each event is independently determined, and in the long-run chance deviations are compensated. In organic realm inhibitive conditions endured in one stage, particularly in early years of infancy and childhood, cannot be eradicated later by more propitious conditions. There is also reason to believe that, in a measure, an organism responds to the total complex of the environment in a man-

ner that is more or less unique, according to the interrelation of the multitude of factors, constituting the environment, with each other and with the dimension of time. To fully evaluate the specific effects of the environmental complex, it may be necessary to study the environmental complex and the organism as a unique historical event. To the extent that this uniqueness characterizes organic phenomena, to that extent correlation method of analysis is futile.

Discontinuity in the effect of a given environmental condition introduces another difficulty. For instance, the caloric intake of food below a certain limit is known to inhibit growth; this limit may vary widely in different individuals, both for genetic and environmental causes. Above a certain minimum, depending on the organism and its milieu, the caloric content may cease to have a differential effect, but the presence or absence of different amino acids may attain a differential significance. The specific level at which these become of differential value would again differ in different individuals. At another level the presence or absence of certain salts, and again of certain vitamins, or the balance between these different nutritional elements may attain a differential significance, again complicated by the genetic makeup of the organisms and by other environmental conditions past and present. The organic traits would show a continuity from individual to individual, but the effect of the environmental variables affecting the trait may be discontinuous, minimizing the correlation that may exist between the environmental variable and the organic process at specific stages. It is easy to see how discontinuity of the effect of a given environmental variable will tend to minimize the apparent interrelation between this variable and the organic trait with which it is correlated. Moreover, since both practical and theoretical limitation of correlation method force one to deal with relatively broad categories this accentuates the aberrant influence.

These, and other more specific limitations of correlation technique as pointed out by Court ('30), Burks ('26), Burks and Kelley ('28) appear amply sufficient to account for the untenability of causal deductions from correlation coefficients. In fact, in view of current genetic science, the surprising uniformity of the correlation coefficients, believed to be the best evidence of the validity of correlation method in evaluating the contribution of nature and nurture, becomes one of its chief weaknesses. Modern genetic science indicates that genes, which appear differentially responsible for various somatic traits, vary in number, in method of transmission, in frequency in a given population, in relative stability, in dominance, and otherwise, all of which would have a different effect on the correlation coefficients for different traits of parents and offspring or for the traits of offspring *inter se*. This expected variation is not ful-

filled by the coefficients which have been obtained by Pearson and his followers. The uniformity found in the coefficients for such varied traits as eye color, stature, intelligence, and conscientiousness cannot be interpreted to be a measure of the effect of heredity; such an interpretation is untenable not only on the basis of evidence showing the effect of environment on certain ontogenetic traits, as I have attempted to demonstrate in my study, but such an interpretation is also contradicted by our present day knowledge of genetic mechanism, and its mode of operation.

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DISPERSION IN MAN-HOUR PRODUCTIVITY SINCE 1929 [1]

By Arthur F. Beal

This paper deals particularly with the effects of the depression upon man-hour productivity. The results show that apparently for some industries the productivity increased very greatly during the depression, while for others it decreased appreciably.

In the March, 1930, issue of the *Monthly Labor Review*, published by the Bureau of Labor Statistics, there were given indexes of productivity in eleven manufacturing industries for a number of years ending with 1927. A factor used in the former study was the number of customary or full-time hours worked per week by the wage earners. With industry running with a more or less level keel, such as prevailed at that time, the use of an index representing full-time hours per week from year to year was deemed to be representative of changes in working conditions, and satisfactory for the purposes of that study. During recent years, however, conditions in industry have been quite different, the wage earners being able to work only a few days of each week.

The earlier method of computation, therefore, no longer applies, and it was necessary to revise the method somewhat. It was necessary to use the number of hours actually worked per week in lieu of the customary or full-time hours. Also, for a few of the industries, the indexes of production were revised by giving lower weights to some of the smaller and less important items of output. The figures presented have all been obtained by the new method rather than by quoting those for the earlier years from the former study; however, the revised figures down to 1927 show but slight deviation from those formerly obtained.

Table I gives for each year the index of the production per man-hour in each of the eleven industries; the period covered extends from 1914 to 1931, the former being used as base. Confirming results obtained for 1927 in the former study, the index for 1931 for every industry is above 100, i.e. each of the eleven industries has apparently experienced an increase in production per hour since 1914. The order in which these industries have been listed in the table is in accordance with the index of productivity for 1931, the industry with the lowest productivity being listed first and the one with the highest productivity last. Relative to 100 representing 1914, the base year, the productivity for 1931 ranges from 136 for boots and shoes to 512 for rubber tires and tubes.

Indicating more exactly the method of computation used in this study,

[1] The material herein presented is the result of an investigation made by the writer in an unofficial capacity. It has not been submitted to the Bureau of Labor Statistics, either for criticism or approval. It is solely the product of the writer.

TABLE I

INDEXES OF PRODUCTIVITY IN 11 MANUFACTURING INDUSTRIES

Year	Boots and shoes	Cane sugar refining	Meat packing	Leather tanning	Steel works and rolling mills	Paper and pulp	Cement manufacturing	Petroleum refining	Blast furnaces	Motor vehicles	Rubber tires and tubes
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1914	100	100	100	100	100	100	100	100	100	100	100
1919	110	86	96	100	102	104	106	99	95	138	168
1921	118	91	121	129	106	102	127	109	133	199	221
1923	119	109	122	131	129	124	134	140	145	258	287
1924	117	123	129	130	128	131	138	171	152	263	332
1925	117	140	128	131	150	137	147	183	191	264	336
1926	117	147	135	132	155	146	156	174	199	284	345
1927	126	138	133	141	156	151	167	184	201	268	367
1928	131	137	136	144	170	160	178	210	216	281	404
1929	130	132	132	142	168	158	181	188	248	346	391
1930	123	133	130	146	158	159	193	182	266	326	421
1931	136	141	144	154	160	181	203	206	276	306	512

it consists in bringing together three series of data for each industry: (1) number of physical units produced; (2) number of wage earners in the industry; and (3) the average number of hours actually worked each week. Each series, consisting of a value for each year, was reduced to an index with 1914 as base. The product of the two indexes on wage earners and hours worked each week gives an index of the total number of hours worked in the industry each year. This divided into the index of physical production gives the final index of man-hour productivity.

As to the sources used, for the first and second series, i.e. physical production and number of wage earners employed, the data published by the "Census of Manufactures" were used throughout. This is the most accurate source available and the most comprehensive for most industries. For the even-numbered or inter-census years since 1923, the number of wage earners employed in each case was obtained by interpolation between the census figures by using the Bureau of Labor Statistics indexes of trend of employment for each industry as the interpolating medium. And the production for inter-census years was likewise obtained, when necessary, by interpolation between the census data using figures reported by trade associations as the interpolating media.

To obtain data for the third series used in the computations, i.e. the number of hours worked each week, it was necessary to collect data from several sources. This factor, consequently, is probably the least precise of the three used. The first source on hours per week was the census. For each of the four census years 1914 to 1923, and for the year 1929,

data were published by the "Census of Manufactures" giving prevailing hours of labor for each industry; a special tabulation was also made for these industries for 1931. From these it is possible to derive for each of these census years the average number of full-time hours customarily worked per week for each industry. A second fruitful source of data on hours worked per week was the series of wage surveys made for specific industries by the Bureau of Labor Statistics. These provide both the number of hours actually worked each week as well as the customary or full-time hours; and, therefore, the ratio of one of these factors to the other is obtainable. However, these surveys were made only on alternate years or less frequently for some of the industries, while for others only one or two were available for the entire period.

A third source of data on hours worked per week was obtainable by a special use of the "trend-of-employment" data regularly collected by the Bureau of Labor Statistics. These data, consisting of both employment indexes and aggregate pay rolls, have been compiled since 1923; and the ratio of the index of pay rolls to the index of employment furnishes a new index which represents the average number of hours actually worked. This new index should be reliable, provided there have been no changes in rates of pay. By combining the number of hours actually worked in a week in any one year with this new index, one can obtain the number of hours worked per week for each industry studied during each of the other years since 1923. This new index, together with the method described for determining hours worked per week, has proven to be surprisingly useful, particularly for the interval 1926 to 1931. By this plan it was possible to carry the study through the peak period 1928 and 1929, and the subsequent depression period up to the end of 1931.

Of course, pay rate changes will introduce a small error into results obtained by this process, but wage rate changes did not reach a significant percentage of the total prior to about the third quarter of 1931. Furthermore, corrections of about three per cent were made for 1931, and were able to bring the results into close harmony with accurate man-hour figures from still another source—actual man-hours obtained in connection with the regular "trend of employment" data since January, 1932. Taken on the whole, the figures used on hours per week had an accurate source for comparison for 1932. They appear reasonable, and are believed to be correct within only a few per cent.

When the productivity for each industry for 1931, as given in Table I, is compared with that for the corresponding industry in 1929 for the purpose of ascertaining the effect of the depression, it will be noticed that an increase has occurred for all industries except two—steel works

and rolling mills, and motor vehicles. For some of the eleven industries studied, the increases of 1931 over 1929 were quite large. If the percentage change in productivity between 1929 and 1931 be computed, and the industries arranged in rank according to this percentage change, the result is that shown in Table II. The change in productivity, i.e. in the

TABLE II

DISPERSION IN MAN-HOUR PRODUCTIVITY IN SELECTED MANUFACTURING INDUSTRIES, 1929 TO 1931

Industry	Indexes of productivity (1914=100)				Possible causes of the dispersion in productivity			
					Wage earners employed in 1929		Changes 1929–1931	
	1914	1929	1931	Change* 1929–1931	Total number	Per plant	Wage earners	Production
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rubber tires and tubes	100	391	512	+31.0	83,263	915	−41.0	−30.2
Paper and pulp	100	158	181	+14.4	128,049	†151	−15.7	−14.9
Cement	100	181	203	+12.4	33,368	192	−27.1	−26.7
Blast furnaces	100	248	276	+11.0	24,960	238	−46.5	−57.0
Meat packing	100	132	144	+ 9.6	122,505	96	−12.9	− 5.7
Petroleum refining	100	188	206	+ 9.5	80,596	207	−14.6	− 9.1
Leather tanning	100	142	154	+ 8.2	49,932	106	−15.8	−15.1
Cane sugar refining	100	132	141	+ 6.8	13,912	665	−14.8	−13.4
Boots and shoes	100	130	136	+ 4.5	205,640	153	−11.8	−15.1
Steel works and rolling	100	168	160	− 4.9	394,574	812	−32.9	−53.9
Motor vehicles	100	346	306	−11.5	447,448	‡920	−36.2	−56.4

* Computed from productivity figures expressed to tenths.
† Paper mills only; not including pulp mills.
‡ Motor vehicle plants only; not including bodies and parts plants.

rate of production per hour, is given in column 5 of the table. According to that table, the rubber-tire industry increased its hourly rate of production in the two-year interval by 31.0 per cent while the motor-vehicle industry apparently declined in rate of production per hour by 11.5 per cent. The two industries which showed decreases in rate of production —steel workers and rolling mills and motor vehicles—appear, of course, at the bottom of the table. There was dispersion in the productivity prior to 1919, but the average dispersion per biennium from 1923 to 1929 was much less than that observed between 1929 and 1931. Furthermore, the average per biennium for the earlier period showed no decrease in productivity comparable with that of 11.5 per cent showed by motor vehicles during the biennium 1929 to 1931.

This leads to an interesting question: What are the probable causes of these large variations in productivity; or more particularly, why should the productivity in the rubber-tire industry have increased by about 31 per cent, while the productivity of the motor-vehicle industry declined some 11 per cent? This is of especial interest since these two industries are closely allied, both having experienced great expansion

during the last two decades. To assist in shedding light on this question, columns 6, 7, 8 and 9 have been added to Table II. These suggest several possible causes.

As to the first possible cause, it is to be noticed from column 6 of Table II, that the three largest industries in the list, as measured by number of wage earners employed, are found at the bottom of the table. This suggests that size alone leads to great specialization of labor within an industry, and possibly also to a certain degree of inflexibility. It has been shown elsewhere, however, that inflexibility in productivity is generally associated with size of individual plant, the larger the plant the greater the inflexibility. For this reason the average number of wage earners per plant in 1929 is given in column 7. These figures contradict each other. In general, the industries with large plants—except one, rubber tires—are at or near the bottom of the table. For the tire industry, the number of wage earners per plant is about the same as for the motor vehicles, yet the one appears first in the table and the other last. The fact that the rubber-tire industry does not follow the rule as to size of plant probably is due to the prevailing type of productive machinery used. This will be discussed later.

A second cause of the dispersion in productivity is the effect of serious reduction in total output. Data on this are given in column 9 of the table. The two industries at the bottom of the list, the ones with negative changes in productivity, suffered tremendous reductions in total output. For steel works and rolling mills, the production was 53.9 per cent less in 1931 than it was in 1929; and for the motor-vehicle industry, the production was 56.4 per cent less than that in 1929. In other words, in both of these industries the total production in 1931 was less than half that of 1929. It is, of course, natural that such a large decrease in total output would have some effect upon the hourly rate of production. On the other hand, it is also true that blast-furnace activity likewise declined during the biennium by more than 50 per cent, but in that industry the productivity apparently increased by 11 per cent. This latter increase in rate of production, in contrast with the decreases shown by the other two industries mentioned, is almost certainly due in part to the fact that the blast-furnace industry is relatively small with an average of only 238 wage earners per plant in 1929 as compared with 812 in steel works and 920 in motor vehicles. It thereby possesses a certain degree of flexibility lacking in the others. The favorable showing by blast furnaces over steel works was probably also due in part to the closing down of small furnaces and inefficient plants. This no doubt tended to maintain a high rate of productivity per hour in the case of the smaller industry.

A third possible cause for the wide dispersion in productivity during the depression involves the general methods of operation within the several industries. The rubber-tire industry, which showed the most favorable change in productivity during the two-year interval, is one in which the machines used are relatively small and individually manned. A complete tire is made on one small machine. Furthermore, in this industry there is also ample opportunity for the skill of the operator to display itself, there being no fixed maximum limit in the speed of operation. With these conditions as a background, and considered jointly with a 30 per cent reduction in total output, management would be in a position to attain unusual productivity per hour merely by laying off the less skilled workers and closing down the more antiquated machinery, thereby putting the best workers on the most efficient machines. Increased diligence on the part of the workers, either for the purpose of trying to retain their jobs or to maintain their former earnings under reduced hours of operation, no doubt would also have a beneficial effect upon average productivity. In other words, large reductions in total output call for much selective administration on the part of the management of any plant; and this selective administration alone, under the conditions just described, would result in a large increase in the average rate of production per hour.

In contrast to those situations where skill and individuality have ample opportunity to increase productivity, are the conditions found in the steel and automobile industries. These two industries operate largely by means of mechanical conveyors, so that the speed of operation is at all times fixed by the speed of the conveyor. It is true that the speed of the conveyor is probably set at the maximum which the average skilled workman can maintain, but this also provides a fixed maximum beyond which it is impossible for an individual workman to go. Under this plan, therefore, there is practically no opportunity for unusual skill or increased diligence on the part of an individual worker to increase his production beyond the fixed limit. With this type of operation, any lost time, from whatever source it may arise, results in reduced average production per hour, in distinct contrast to the rubber-tire industry.

To summarize, it has been attempted to show two things in this paper: (1) that there apparently occurred appreciable dispersion in man-hour productivity during the depression between 1929 and 1931; and (2) that, from common knowledge, the figures obtained are apparently reasonable and correct.

FACTORS MAKING FOR INSTABILITY

By J. M. Clark

The concept of economic balance is an elusive and difficult one. The more one looks at it, the more difficult does it appear to achieve an economic system, responding to all the forces of change in the modern world, and still moving smoothly without revulsions, waste of productive powers or compulsory idleness. Among the outstanding factors of instability as revealed by the statistical record are the discrepancies between the movements of capital equipment and durable consumers' goods on the one hand, and short-lived consumers' goods on the other. The durable goods show by far the more violent fluctuations. Along with this fact and helping to explain it, are the movements in the volume of credit.

Observation of these movements, so uniformly characteristic of business cycles, leads to the conclusion that, under the existing type of business system, we may approximate full employment, or balance between consumption and accumulation—a concept which could probably be defined—but never both at the same time, because we never have full employment except when we have an essentially temporary spurt of accumulation which crowds, let us say, two years' production of durables into one and therefore cannot continue. This is what traditional "prosperity" means; and if we are wise we shall not yearn to return to it without modifications.

The original stimulus to such a movement may come in a number of forms. The more important thing is that we have a system which intensifies impulses and can bring about positive ups and downs from impulses whose direct effect might only be changes in the rate of growth. If the demand for some consumable product begins to increase by 10 per cent instead of 5 per cent as formerly, demand for durable equipment to produce it may increase 30 per cent or more; and if the increase in demand for the product falls to 2½ per cent, demand for durable equipment may suffer a positive drop of 15 per cent or more.

When this happens, the purchasing power of the producers of durable equipment changes correspondingly, bringing about a further change in general consumer demand and still further intensified reactions on demand for means of production. Thus the cumulative process of expansion or contraction gets under way.

One vital condition is elastic credit. If the producer could buy equipment only with money actually saved out of income derived from past production, buying more equipment would mean buying fewer

consumption goods, and hence an equipment boom and a consumption boom could hardly go together as they do. Other factors are the speculative effects of price changes and the intensified fluctuations of profits.

On the boom the increased output of productive equipment is bound, if maintained, to cause total productive capacity to increase faster than total purchasing power, so that the capital expansion must come to an end, with the result that general purchasing power not merely ceases to increase, but declines, and the cumulative contraction begins. This, and not the waste of fixed capital itself, is the serious result of our spurts of over investment.

What brings it to an end? Probably different forces in different cases, depending on how far it goes and what outside influences intervene. Consumers' spendings probably shrink less than their incomes so long as they have slack they can take up or reserves they can draw on. This also includes expenditures on public and private relief, such as Mr. Knauth pointed out this morning. If the movement is mild, this factor may check it before it has gone very far. Shrinkages in capital equipment outlays cannot go to zero, as there is a minimum of necessary maintenance and there are always some branches in some localities which are not decreasing. As this elastic minimum is approached, resistance stiffens and increases with time as more replacements become overdue. This may lead to a revival if business is in a condition to get the necessary funds. If it is not, and if the thing goes far enough to start the vicious circle of debt deflation emphasized by Professor Irving Fisher, a more serious and prolonged stage may be entered and ordinary forces of recovery may fail to act. Then a shattering bankruptcy and liquidation of the financial structure may have to be passed through if things are left to run their natural course and only after this will the need of maintaining some sort of plant equipment cause capital outlays to begin to move upward from the under-maintenance level they have reached and so start a revival. But at some point bottom is reached.

If things are to run more smoothly, we must think not merely of one more revival of this evanescent sort, but of a more durable balance. This is a vast subject, but I may mention one disquieting problem. The future seems to call for a diminished proportion of our national income to be put into durable productive equipment, while the natural tendency of increased per capita income is toward saving an increased proportion. Thus there is prospect of a lack of balance, which the automatic correctives of the traditional free market do not promise effectively to correct. For this reason, and with reference especially to long-run trends, it still seems pertinent to think of changes in the dis-

tribution of wealth which may increase the share going to those who spend most of what they get—chiefly wage-workers. Even if their savings did increase during the last boom, they still saved less in proportion to income than the rich, and in time would probably have enlarged their standard of spending more fully if the increased income became an enduring fact and not a sudden windfall.

But an increased proportionate share going to these classes means a decreased proportionate share going to profits. And in facing this implication we must face also the conditions necessary for business enterprise to remain healthy with a decreased share of income. One of these is a reduced spread between the efficient and the inefficient producers. Therefore, one of the more serious evils to be avoided in our recovery policy is anything which may serve to protect the earnings of the inefficient and perpetuate them as burdens on the economic system.

THE PROCESSES OF BUSINESS REVIVAL IN THE LIGHT OF 1933 CONDITIONS

By Lewis H. Haney

The significance of business revival processes depends greatly upon what business is reviving from, and toward what future it is reviving. Ordinarily, a study of the processes of revival from a depression is important only because it helps one to figure the relative strength of the existing forces, and to forecast the timing; for ordinarily depressions are much the same, and the requirements for recovery are very similar. In the midst of the 1933 depression, however, the facts are in so much dispute that it is necessary to consider what we are reviving from. Furthermore, the processes are so involved in revolutionary schemes of collectivism and social control, that what we may be reviving for, is not at all clear. Under the "New Deal," the existence of economic laws or equilibria is not recognized, but in their place we have someone's wishes for a 1926 level, or someone's notions about "social justice."

Seen in historical perspective, cycles when subjected to broad economic analysis, are very simple. (Only the selfish interests of politicians, and individuals whose opinions are perverted by personal losses, previous erroneous forecasts, etc., can keep one from recognizing this fact.) The plain facts are these.

(1) Each business cycle starts with an upswing which develops into a boom. The cycle begins with a rising period, and the logical starting point is the "normal" or equilibrium level reached after recovery from the preceding depression. It follows that in 1933 we were still in the late phase of a cycle which began in 1927.

(2) The peak, or the ultimate maximum of the cyclical rise, is fixed by the limits of disequilibrium. A moment's reflection makes it clear that no outstanding failure or "loss of confidence" would be fatal or terminate a boom, if conditions were sound. The striking phenomena which usually mark the period are not fortuitous, and are significant only as indicating the character of the maladjustments or disequilibria which are the real causes of the ensuing recession.

The upper limit depends upon the force of the boom, the factors which facilitate expansion, the resistances to expansion, and the occurrence of any conjunctural events which may serve to precipitate these factors. In the case of all great wars, government credit becomes so involved that facilitating factors are strengthened, and resistances are weakened, so that booms are apt to attain maximum proportions.

Except for the highly developed credit machinery and the more effective organizations for resisting corrective tendencies, I can see no essential difference between the present cycle and those of the past. The boom is always marked by a characteristic tendency to over-discount the future and see a "new era," which is another way of saying "inflationary credit expansion." This finds expression in over-spending, which leads to excessive debt; in an abnormal development of "over-capacity" through over-investment and over-capitalization; and in over-production. Maladjustments in the price structure develop, bringing market disequilibria and complaints of unequal purchasing power as between different groups.

(3) The extent and duration of the ensuing recession and depression depend upon (a) the nature and extent of the boom inflation and maladjustments, and (b) upon the intensity and scope of the initial period of readjustment.

As to the nature and extent of the inflation and maladjustments, I would stress, first, the extent to which the future is discounted, or the amount of over-borrowing and over-spending. These conditions involve the relationships between individuals, and the extent to which private debts are expanded as individuals borrow from one another. More than that, however, they involve government credit and the extent to which nations as a whole mortgage their futures. Over-spending is either limited to the part of the nation which becomes the so-called debtor class, or involves the nation as a whole through "public debt." In the case of post-war cycles, the public-debt element, involving a draft on the nation's future, is very important. (Possibly the ratio between yields on high grade bonds and short term money rates is as good a statistical index of this general aspect of the situation as any.)

But there is the aspect of over-capacity and over-capitalization. Always we find over-investment to a greater or less extent—now in railways, now in real estate, now in industrial plants, but almost always in real estate. (Perhaps an index of this phase is the ratio of total bank deposits to total loans and investments.)

Always we find accumulation of stocks of commodities resulting from over-production at prevailing prices. (Perhaps the ratio of finished goods prices to raw material prices is as important an index to follow in this connection as any. The ratio of factory payrolls to employment is also significant.)

The recession and depression are to be understood as processes of correction, deflation, and liquidation. Naturally, therefore, the duration of the depression depends upon the facilitating factors, resistances,

etc., which affect the working of the corrective and deflationary processes. When a society undertakes to fight these processes, and to obstruct them at every turn, as we have done to an unparalleled extent during the past three years, the depression is necessarily prolonged, and the processes of revival correspondingly delayed.

It is my judgment that the *sharpness* of the business recession depends chiefly upon the duration of the preceding "prosperity" phase, and upon the proportion of "financial" maladjustment. The *depth* of the depression depends chiefly upon the amount of maladjustment at the peak, and the height of prices and inflation. The *duration* depends upon the broad underlying trend of commodity price averages, the sharpness of the recession, the breadth or general scope of the depression, and the extent to which recovery is delayed by premature rebounds. In this connection, the wisdom of the policies followed during the depression is important. Of course, conjunctural conditions, such as a good crop year when foreign crops are poor, may be an important factor.

My point is that *the processes of recovery are conditioned by the recession, and may be discussed from the point of view of the duration of the depression.*

In all major business cycles of record, the financial aspects have been significant, and this is particularly true in post-war periods. In our own cycles the typical sequence of events leading up to the "critical period" or periods, and the ensuing recovery, are somewhat as follows: (1) Following a crash in the stock market and some striking initial failure of a business concern or bank, we have a strained condition develop in New York banks, and usually some outward movement of gold as foreign funds are withdrawn. This initial stage is marked by a decline in the curve of business activity to something like a "normal" level.

(2) In the next stage, we find interior banks failing and funds withdrawn by them from New York, resulting in a draining of the reserves of the New York banks, issues of clearing house certificates by New York banks, and renewed suspensions by New York banks. During this phase, "trade depression" sets in, and a "bear market" in stocks is perceived.

(3) Then comes the "depression" proper, with numerous bank failures and widespread suspensions of cash payments by the banks. A premium on currency results. The significance of this last stage is that intelligent men come to realize the interrelations between "financial" and "business" conditions, and among the different industries and sections of the country. The issues of clearing house loan certificates, which represent a pooling of bank reserves, show that at last men realize

that bank credit depends upon the general business conditions. The premium on currency shows a realization and recognition of the monetary inflation. We may think of such a premium as revealing the amount of the inflation. In short, this last phase represents a facing of the facts, a final clearing away of inflation, and a final correction of the over-discounting of the future by credit processes. The basis is thus laid for a sound new economic deal and for the beginning of the next cycle.

A period of general bank suspensions usually has been the critical point, and, though the depression may drag on for a year or two thereafter, the recovery is then but a question of time. This is true because such a period leads to the final ascertainment of who owns what, and to the beginning of the end of monetary uncertainties.

I cannot too strongly emphasize that a condition vital and essential to recovery from a depression is the settlement of claims and debts to an extent sufficient to allow debtors and creditors to know where they really stand. During the recession the decline in security values, mortgages, etc., accompanied by moratoria and growing inability of debtors to make payments, leads to increasing uncertainty as to what any claim is worth. Creditors do not know how much they can collect, and debtors do not know how much they can or must pay. Asset values become more and more doubtful, and business men, farmers, and financial institutions do not know what their real net position is. This breeds complete uncertainty and stagnation. One of the surest means to establish conditions essential to recovery is the settlement of all this maze of doubt and uncertainty.

Last March, during our general banking suspension, it was to have been hoped that this sort of a settlement would emerge. Actually, however, suspensions were unduly minimized by the prevalence of lax examinations of banks, the ministrations of the R.F.C., the palliatives provided by the Steagall Bill, etc. Now through various similar mechanisms, including the purchasing of preferred bank stock by the government, we are seeking to prevent the settlement of claims of all sorts, and we find 93 per cent of the assets of the Federal Reserve Banks and over 30 per cent of the assets of the member banks consisting of government securities.

Usually this process of financial liquidation marks the end of monetary uncertainties. The worst of our depressions have been characterized by a fear of inflation, and the bottom of the 1873 depression was probably reached toward the end of 1875, when the Specie Resumption Act was passed and the premium on gold disappeared. Similarly, the final stage of the 1893 depression was reached in 1896, when Bryan was

defeated. At these times, far-sighted business men, both here and abroad, realized that the danger of further unsound developments in the currency had practically ceased, and that business plans could be entered upon with some degree of certainty as to the value of money.

In this connection, I would say that it is vital to remember that society consists of individuals, and that recovery in the business processes of society depends upon the motives of the individual business men. Even if society were some super-individual organism, as our idealistic reformers fondly imagine, the only way for it to get well would be through adjustments in the conditions of its individual components. In a true organism, such as an individual is, periods of acute sickness consist in congestions, restrictions, and stoppages, and mental conditions such as worries. These can be relieved only by treatment which applies specifically to given "organs" (cells or groups of cells) or which provides a basis for certainty and freedom from worry. Just so in a society, it is necessary that deflated prices should relieve commodity congestions, and that intersectional and international trade be freed to allow the circulation of commodities. At the same time, it is highly important that the members of society be relieved of worries and fears with reference to arbitrary fluctuations in the purchasing power of money and the value of claims.

In short, I see the "crisis" in a business depression as somewhat resembling the crisis in an acute illness of an individual. It is necessary to liquidate frozen loans to clean out the business system. It is necessary to settle debts, so that the normal functioning of the members of society can be resumed. When neither the creditor nor the debtor knows what his position really is, neither one can function properly.

It is necessary to get back to a cash basis, in order that the maladjustments and poisons and worries of the past may be eliminated, and a fresh start be made. The collapse of credit in a business recession means that too much credit has been used—the future has been overdiscounted—and this requires that more cash be used. But the only way to get enough cash is to get the purchasing power of the dollar up. This, of course, means lower prices. The lower prices are, the smaller the amount of cash required to do a given volume of business. Thus to get prices deflated and to get them into a workable relation with one another is, as it were, the object of a business recession, and is the essential requirement for revival.

But this object—this requirement—cannot be attained so long as monetary uncertainty prevails. The process of final recovery from this depression will necessarily be one in which the dollar is definitely revalued on a workable basis, and this can be accomplished only when

the conditions necessary for maintaining a definite monetary standard are re-established, namely balanced budgets and reasonable freedom of trade.

My thought is that any lasting results from government action to get business revival must be directed toward facilitating the processes which are required by the nature and causes of booms and depressions, and which would usually occur in time. The medicines have to be taken and the operations have to be performed. The government can administer the ether and the adrenalin skillfully. It can even become a skillful surgeon. But just as government regulation is most beneficial when so directed as to get the same result as competition would get if it could work, so in dealing with business depressions, the government must proceed on the basis of "human nature" and business conditions. This does not mean *laissez faire*. It is just economics.

ESTIMATES OF UNEMPLOYMENT DURING THE LAST FOUR YEARS [1]

By Theodore J. Kreps

To estimate the number of unemployed by the survey method, as do Colonel L. P. Ayres [2] and the American Federation of Labor,[3] requires not only an extremely careful and painstaking analysis, industry by industry, of conditions all over the United States, but also an intimate and detailed knowledge thereof, such as can be possessed only by a governmental bureau or by the research department of a large bank or national labor organization. The independent investigator is tempted to experiment with short-cuts.

One such experiment is here presented (see Chart I). The fundamental procedure was twofold: to find out how many still had jobs in a few selected industries and to subtract that number from, or apply that percentage to, different totals in order to get a minimum, a probable, and a maximum estimate of the amount of unemployment. In all the calculations no attempt was made to evaluate the unemployment within employment which comes into being when production schedules are staggered, or working weeks and working days shortened. Moreover, in all cases the number employed on the average in 1929 was used as the basis of comparison. This amounts to assuming that in 1929 no unemployment existed. Furthermore, it has been assumed throughout that 3,400,000 entrepreneurs, the probable number of those self-employed elsewhere than on the farm, were able to maintain their self-employment. Finally, there has been held constant the number of gainfully employed in agriculture, estimated in round numbers to be ten million.

The numbers employed in various industries were computed from the indexes given in the *Monthly Labor Review* adjusted to 1929 as the base year when necessary. In those few instances in which quotations for specific months were lacking, nominal figures were computed by straight line interpolation. The building industry presented special difficulties, inasmuch as only monthly percentage changes are published by the Bureau of Labor Statistics. Though the unemployment census of January, 1931, covers only a few selected cities, it was assumed that the trend in building employment for those cities between April, 1930, and

[1] Summary of a paper presented before the round table on unemployment. A reading of the article of Dr. Meredith B. Givens entitled "Employment During the Depression," *Bulletin 47*, National Bureau of Economic Research, June 30, 1933, suggested the idea that his annual figures could readily be obtained quarterly. For carrying out the idea, I am especially indebted to Mr. Walter A. Radius, a graduate student at Stanford University, who kindly consented to make the computations involved.

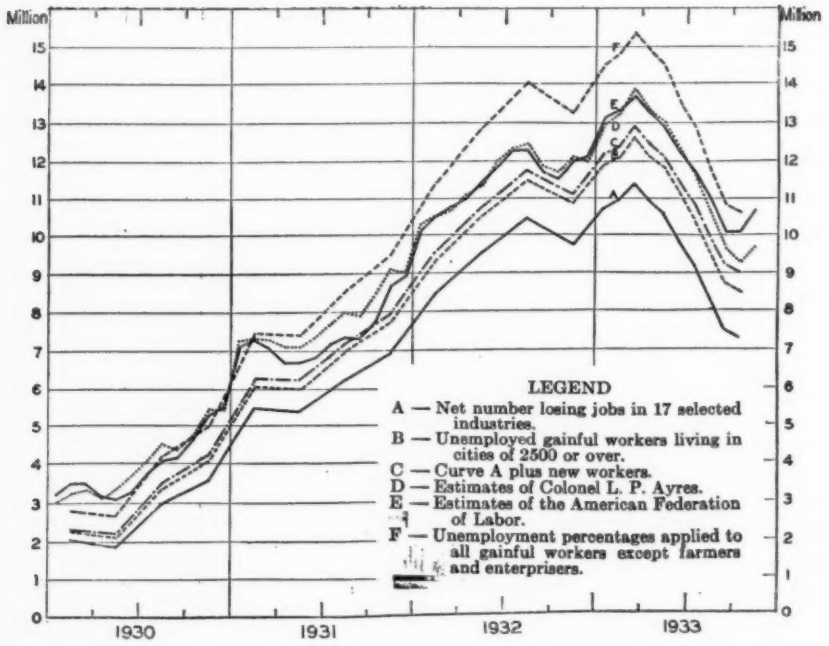
[2] The Cleveland Trust Company, *Business Bulletin*, Vol. 15, No. 1, January, 1934.

[3] *The American Federationist*, "How Many are Unemployed?" October, 1933, pp. 1–8.

January, 1931, when adjusted by the seasonal index given in the Fifteenth Census Report on the Construction Industry, is representative of the building industry in all cities.

CHART I

ESTIMATES OF THE NUMBER OF UNEMPLOYED IN THE UNITED STATES 1930–1933



Curve A represents the minimum of unemployment, namely, those who lost their jobs in the seventeen industries for which the Bureau of Labor Statistics obtains figures of employment. The total number employed in these industries was estimated from the 1930 Census of Occupations, the Censuses of Unemployment in 1930 and 1931, the Census of Manufactures, and the census reports upon particular industries, including the Census of Distribution for the wholesale and retail trades. In many instances the occupations were perforce arbitrarily allocated. The average number employed in 1929 in the manufacturing and mechanical industries totalled 13,864,645 persons, in retail trade 3,833,581, in building construction 2,396,500, in wholesale trade 1,605,042, on steam railroads 1,597,726, in brokerage, insurance and real estate offices 1,390,663, in hotels and restaurants 1,269,337, in laundries 619,826, in telephone and telegraph offices 566,911, in bituminous coal mining 502,993, in power and light production 287,000, in crude petroleum pro-

duction 204,601, in anthracite coal mining 151,501, on electric railroads and motor buses 197,815, in metalliferous mining 100,455, in quarries 89,370, and in dyeing and cleaning 87,842. The grand total in the seventeen industries is 28,765,800. To get the figures for the probable number employed on the average in 1929 the census reports of April, 1930, were adjusted for the drop in employment as computed by Givens in the article already mentioned.

The assumptions underlying the calculations from which Curve A resulted are four-fold: (1) That all workers not gainfully occupied in the seventeen selected industries (about 20,000,000 or 40 per cent of the total) experienced no unemployment; (2) that all those who sought a job for the first time during the years 1930 to 1933 were able to find jobs; (3) that, on balance, none of those who lost jobs in the seventeen industries were reëmployed in other enterprises; (4) that the sample which the Bureau obtained in the several industries concerned, though it comprised as a rule less than 15 per cent of the total engaged, was none the less a representative and adequate sample. The drop in employment represented in Curve A obviously underestimates the amount of unemployment for it shows only 1,850,000 unemployed in May, 1930, where the 1930 census of unemployment enumerated 2,429,000 Class A unemployed (out of a job, able to work, and looking for a job) and 758,000 Class B unemployed (having jobs but on lay-off without pay).

In Curve B the computed numbers employed for the seventeen selected industries were expressed as percentages (see Table I) of the total employed in 1929, and the percentages applied to the number of gainful workers in cities of 2,500 or over in 1929. Increases in urban gainful workers since that time were computed and added. It is assumed (1) that in cities of 2,500 or under and in rural districts there occurred no net unemployment; (2) that the percentage of gainful workers residing in urban communities remained constant throughout the period, namely, 60.93 per cent, the figure of 1930; (3) that the index of employment in the selected industries represented fairly accurately the condition of the population in cities of 2,500 or over.

It is well known that the depression gave a considerable impetus to the trend of population movement into outlying districts [1] but no estimate is possible. It is probable, however, that such movement was distinctly smaller for unemployed residing in large cities than for those who were already familiar with agricultural or horticultural methods

[1] In the decade from 1920 to 1930 the rural non-farm (village) population increased from 20,047,377 to 23,662,710, i.e., from 19.0 per cent to 19.3 per cent of the total population. This "includes small manufacturing villages and trading centers, unincorporated suburban areas, mining settlements, etc., and a considerable number of families living in the open country but not on farms." *Abstract of the Fifteenth Census of the United States*, Washington, 1933, p. 18.

and who were already living in small outlying tributary communities of less than 2,500 people. Whatever movement did take place from the larger centers was probably offset in part, if not altogether, by the well known movement of dispossessed farmers and migratory laborers in small communities to metropolitan centers.

Curve C merely adds to Curve A the total number of gainful workers

TABLE I

GAINFUL WORKERS AND UNEMPLOYED

(In thousands)

Quarter	Gainful workers				Number unemployed					
	In all occupations	In seventeen selected industries		In urban centers	Column A	Column B	Column C	Column D	Column E	Column F
		No.	Per cent employed							
1st 1930	48753	Assumed constant at 28,765,800	92.8	29705	2062	2312	2370	3253	3565	2822
2nd 1930	48872		93.6	29778	1850	2149	2277	3381	3090	2679
3rd 1930	48992		89.6	29851	2991	3403	3538	4492	4101	4191
4th 1930	49112		87.5	29924	3587	4096	4254	5457	5364	5039
1st 1931	49210		80.8	29984	5521	6133	6286	7364	7345	7492
2nd 1931	49296		81.2	30036	5402	6067	6253	7119	6750	7434
3rd 1931	49383		78.2	30089	6262	7006	7200	8003	7357	8568
4th 1931	49470		75.9	30142	6932	7738	7957	9099	8699	9470
1st 1932	49554		70.6	30193	8471	9353	9580	10500	10486	11426
2nd 1932	49637		66.7	30244	9593	10555	10785	11387	11470	12876
3rd 1932	49720		63.6	30294	10469	11521	11744	12460	12344	14030
4th 1932	49802		65.9	30344	9797	10892	11154	12115	12008	13295
1st 1933	49902		61.9	30405	10953	12133	12410	13238	13294	14802
2nd 1933	50010		63.1	30471	10610	11845	12175	13051	12896	14492
3rd 1933	50118		71.1	30537	8306	9550	9979	10654	10948	11794
Oct. 1933	50190		74.6	30581	7307	8561	9052	9744	10702	10647

Column A = net number losing jobs in selected industries.
Column B = unemployed gainful workers living in cities of 2,500 or more.
Column C = Column A plus new workers.
Column D = estimates (Feb., May, Aug., Nov.) of Colonel L. P. Ayres.
Column E = estimates (Feb., May, Aug., Nov.) of the American Federation of Labor.
Column F = unemployment percentages applied to all gainful workers except farmers and enterprisers.

which would normally have come upon the market because of the increase in population. It assumes that the percentage of gainful workers to total population (39.77 per cent in 1930) remained unchanged. Allowances were made for net emigration, 127,000 in 1931 and 165,000 in 1932.[1] It also assumes that, on balance, none of those who tried to get jobs for the first time secured one.

Curve D, Colonel Ayres' estimates, corresponds very closely with Curve E, the estimates of the American Federation of Labor.

Curve F obviously exaggerates the amount of unemployment. It as-

[1] The estimates of increases in population up to 1933 were taken from P. K. Whelpton, "Population," *American Journal of Sociology*, May, 1933, Vol. 38, No. 6, p. 826.

sumes that the employment on the farms remained constant (the increase in unpaid family labor offsetting the decrease in hired help) despite the fact that the net gain in farm population was 416,000 in 1930, 656,000 in 1931, and 1,001,000 in 1932, at the same time that the net movement from the city to the farm was 17,000 in 1930, 214,000 in 1931, and 533,000 in 1932.[1] It also assumes that the employment for such proportion of the members of the professional and clerical groups as are not included in the seventeen selected industries approximated the average shown by the indexes. This is again not true, inasmuch as the number of municipal, state, and federal employees has not decreased very much. Even in the professions, among teachers and others, the amount of unemployment has been considerably less than among the unskilled workers.[2]

In all the computations it has been assumed that no unemployment existed in 1929. If that fact be borne in mind, and to mention a round number, a million be added to Curves B and C, their correspondence with the figures of Colonel Ayres and with those of the American Federation of Labor becomes noteworthy. In brief, if the proper parent population be selected, the indexes of employment now being compiled by the Bureau of Labor Statistics furnish a reasonable basis of estimate of the amount of unemployment. There is reason to believe that a short-cut method might fairly readily be devised and controlled which would afford, even on the basis of the meager data now available, reasonably prompt and reliable estimates of unemployment in the United States.

[1] Bureau of Agricultural Economics, United States Department of Agriculture, *The Agricultural Situation*, May 1, 1933, Vol. 17, No. 5, p. 4.

[2] See especially M. H. Hogg, "Ebb-tide of Employment," *Mid-monthly Survey*, New York State Department of Labor, August, 1933. For May–June, 1933, she shows in her survey of New Haven that only 20.5 per cent of the professional male workers were unemployed as opposed to 44.5 per cent of the unskilled workers.

THE RELIABILITY OF VARIOUS STATISTICAL SERIES AS CITY AND REGIONAL BUSINESS INDEXES[1]

DEPARTMENT STORE SALES, BY A. W. ZELOMEK

Since the War this country has been deluged with new statistical series, but they have dealt with production and price to the almost complete neglect of the even more basic phenomena of consumer demand. However, the 1929 Census of Retail Distribution was an important step in the right direction.

Department store sales have become established as a primary indicator of basic business conditions. Because of the wide range of products sold by department stores, a sufficient sampling of their sales volume should reflect retail trends affecting almost every kind of production. Also, the larger department stores are qualified to reflect accurately and sensitively consumer habits and preferences. Department store business is particularly important in the larger and medium-sized cities. However, it is thought that we have depended too much on the Federal Reserve index of department store sales as a general retail business measurement. The department stores reporting are too few in number and the volume of department store business is too small in relation to national consumption as a whole to furnish a reliable basis for inferences.

In a metropolitan area, department store sales are good indicators of retail conditions. In fact, large metropolitan stores have been extending their influences in outlying districts either through opening branches or offering greater inducements to suburban shoppers in prices and styles. However, for an indicator of consumer buying in smaller urban centers and rural areas, sales data for dry goods stores, mail order houses, general chain stores, and variety stores should be considered in addition to those for department stores. The Department of Commerce is now making an effort to measure consumer buying through the use of food, automobile, variety chain, and mail order sales. I believe an index made up of such components will ultimately be more valuable as a measurement of consumer buying than the department store sales index.

BANK DEBITS, BY M. M. DRAKE

Bank debits, as herein referred to, are defined as debits to individual accounts, excluding bank and bankers' debits. As a first step to insure comparability between cities, a standard formula of computation must

[1] Papers abstracted by Elma S. Moulton, Bureau of Foreign and Domestic Commerce.

be adopted by all clearing houses, and be strictly adhered to. Secondly, the debits for each city should be weighted in the ratio of the total banking transactions represented by the clearing house reports. And thirdly, each city's figures should be weighted on the basis of the normal spending power draw-off of the dollars making up its transactions. Statistics of bank debits involve considerable duplication, e.g. a car of livestock may be bought and sold eight or ten times between the farm and final destination, and in such transactions only the first payment plus later profits, transportation and feeding charges represent spendable dollars. Furthermore, bank debits reflect speculative activity, particularly in those cities having stock exchanges. Price enters the picture, also, as bank debits are dollar figures.

As they exist, bank debits to individual accounts are not dependable barometers, but we believe that if they can be placed on a sound basis they will become our best business barometer. Their timeliness is a very valuable feature.

STREET RAILWAY AND BUS PASSENGERS, BY EDMUND J. MURPHY

The reliability of transit riding—street railway and bus—as a business indicator is impaired by actual and potential competition from private automobiles and cut-rate taxicabs. While the total volume of riding in a community is a good index of business conditions it tends to divide itself among the various types of transportation in varying proportions in different communities and at different times in the same community according to local conditions. As a result the record of riding on any one type of vehicle may not reflect the trend of the total riding in the community and, in consequence, will fail to reflect the trend of business. The number of passengers carried in cut-rate taxicabs is seldom available and, of course, the amount of riding in private cars is never known so there is no way of getting at the total volume of riding in any community. However, transit riding is potentially a valuable business barometer, as it is affected by, and in turn reflects practically all activities in the community—industrial, commercial, social, educational, and recreational. It is thought that in the not too distant future the automobile industry will be stabilized and the cheap taxicab, a product of the depression, will largely disappear. The trend of transit traffic should then again reflect sensitively business conditions.

EMPLOYMENT AND PAYROLL DATA, BY HOWARD G. BRUNSMAN

Accurate employment and payroll data are useful in a community as direct or indirect indicators of many factors in the business situation.

They indicate production activity, purchasing power, available labor costs, number of people with jobs, and less directly, unemployment and relief needs. Each of these factors calls for a slightly different type of figure. The number of persons on the payroll is probably the best measure of the number with jobs, unemployment and relief needs. Total man-hours form a most suitable measure of productive activity, and payroll totals offer the best indicator of labor costs and purchasing power. The Bureau of Business Research of Ohio State University has limited its employment report to the number of persons on the payroll, as the other data are not generally available.

Industrial inclusiveness of the data is an important factor in the organization of an employment index. Manufacturing is a primary group which is always included. Next in importance probably is the mechanical non-manufacturing industries group, including building and construction, mines and quarries, and transportation and public utilities. The service and trade group includes wholesale and retail establishments, hotels, restaurants, theaters, banks, brokerage houses, insurance and real estate concerns, and similar enterprises. Data on public employment may be available in some localities. It is practically impossible to secure adequate reports on employment in professional and domestic service; and agricultural employment is of minor importance in urban areas. The reports published by the Bureau of Business Research have followed the policy of the Ohio Division of Labor in including only the manufacturing, construction, service, trade, and transportation and public utilities groups.

For these reports an urban community has been defined as including all the area within which industrial concerns normally compete with each other for the resident labor supply. The coöperating concerns give the Bureau a 35 per cent sample of Ohio industry.

In computing its index of employment, the Bureau secures the percentage change in number of employees in the current month, as compared with the preceding month, in an identical group of firms. The index for the preceding month is adjusted by this percentage change to obtain the current month's index. If employment indexes are computed by different agencies for a number of cities, the indexes should be placed on the same base for all the areas. Comparison of the employment indexes prepared by the Bureau with indexes based on the Ohio Division of Labor and Bureau of Labor Statistics data indicates that the Bureau indexes are very reliable indicators of the employment in the local areas of Ohio.

It is thought that employment figures are of sufficient interest in themselves to justify their inclusion in a group of business indicators.

Furthermore, both man-hour and payroll totals would be of considerable interest and should be considered when the data are available.

LOCAL TELEPHONE MESSAGES IN METROPOLITAN AREAS, BY S. L. ANDREW

Stating the conclusions first: (1) accurate data on the total number of local telephone messages in metropolitan areas are not generally available; and (2) if they were available, there are reasons why they would not be reliable indicators of business in general.

The reason for the first statement is that such data are not required by the telephone companies for administrative purposes, and are not by-products of the collection of useful administrative statistics. Such data on local telephone traffic as are collected, are collected either for the purpose of determining the number of operators needed to handle, with customary dispatch, the traffic which is manually-operated, or for the purpose of providing a basis for billing those subscribers whose payments for local telephone service are dependent upon the number of messages they originate. For these purposes data are required for only a part of the total traffic.

Some of the reasons for the statement under (2) above are as follows:

1. The data are arbitrarily affected whenever there is a change in telephone rates. Such changes, of course, do not occur frequently in any given locality; but when they do occur, their effect upon the volume of traffic may be appreciable and may extend over a considerable period of time.
2. The telephone companies offer various classes of local service and there is more or less continuous shifting of subscribers among these classes of service; and this situation affects total usage without respect to changes in general business conditions.
3. A large proportion of telephone messages are for social and domestic purposes rather than business purposes. This part of the total traffic is unresponsive to changes in business conditions, except in the case of an exceptionally severe depression such as the one we are now experiencing.
4. In any particular area the volume of local messages may be affected in a way which does not reflect changes in business activity by special events, such as extraordinary weather, major accidents, celebrations of one kind or another, and other events which arouse public interest.

CONSTRUCTION CONTRACTS AND BUILDING PERMITS, BY HOWARD G. BRUNSMAN

The primary source for construction contracts data is the F. W. Dodge Corporation, and for building permit data, the division of building inspection of the local communities. The classification and completeness of the available permit data are dependent entirely on the office issuing the permits.

Unfortunately the building statistics for most areas are available for only the central city. Figures for the Cleveland metropolitan area show that the city total is fairly representative of the area for non-residential building but that the total for the remainder of the area is a better measure of residential building. In other words, neither group presents an adequate indication of the fluctuations in all building or all construction in the total area. Monthly figures on construction contracts awarded are available for 81 cities in 37 eastern states, but such figures are available for only seven metropolitan areas (city and adjoining counties) and for them only since 1930. There are other limitations of construction contract data also.

Short-comings in building permit records include lack of comparability in summaries prepared in different communities; the fact that permits are not secured for many public projects, as schools and recreation centers; omission of street, park and drainage projects; lapsing of permits, construction not being carried out; and inaccuracy of cost estimates.

In its analysis of building activity the Bureau of Business Research of Ohio State University relied chiefly on building permit records as they were available in far greater detail. They were classified by communities within the area and also by type of building.

Building permits serve as a measure of building activity being initiated, rather than of construction operations actually under way. The value of permits should serve as an indicator of employment in the building trade. It is impossible to determine any short-term relationship between building and business, but the building permit record does satisfactorily measure activity in one industrial field which is important in the general well-being of the community.

Because of the relatively large number of permits for low cost buildings and alterations, the estimated cost of total building permits is a better measure than the number of permits. The number of family accommodations provided by new residential buildings, which is available from the permit records, is a valuable index of residential building, as it is not influenced by changes in the type of structure nor by changes in the size or value of the typical residence.

The value of construction contracts awarded in the various urban areas would be the most useful measure of building initiated, but the compiling agency would have to enlarge its presentation of data to include the counties in the metropolitan areas and also compile comparable data over a sufficiently long past period to permit valid interpretation of current figures, in order to make available the necessary data. Barring this, the estimated cost of buildings for which permits

are issued in the several communities making up an urban area would be the best measure available.

REGIONAL PRODUCTION INDEXES, BY ARYNESS JOY

The term "production index" is being used here in its generally accepted meaning of measurement of output in terms of physical volume. Local and regional index numbers of this sort are extremely rare. This is partly because of a lack of satisfactory information, partly because few local research agencies have sufficient facilities to collect the requisite reports and to construct and maintain a complicated piece of statistical machinery. For that reason simple series purporting, usually erroneously, to represent something vaguely called "business activity" are far more common.

The best reports on volume of output are national, not local, although to an increasing extent national collecting agencies—and particularly the departments of the Federal government—are making tabulations on a local or regional basis. Local collection of production statistics is particularly difficult for industry except for an agency with a reputation for disinterestedness—such as a University Bureau of Research. Ordinarily, local manufacturers and merchants are reluctant to report on their business to the Chamber of Commerce or other local trade agency, through which their competitors might possibly get some confidential information. For that reason the principal sources for current information on production are national agencies which can be persuaded to subdivide reports. It is doubtful whether they can be expected to make a subdivision on such a narrow local basis as a city—both because of expense and the danger of disclosure of information. Thus wider areas—states, groups of states, Federal Reserve districts, or well defined industrial or agricultural areas—are more likely to be the unit for these indexes.

As a matter of fact, more information is available on a regional basis than is generally believed. All that is required is diligent digging and a persuasive way with national collecting agencies, plus some work in supplying information for industries that are especially important locally, but are not represented in reports for the country as a whole.

The possibilities are illustrated by the Index of Business Activity in the Pittsburgh District, comprising eleven western counties in Pennsylvania, published by the Bureau of Business Research of the University of Pittsburgh, and the Index of Productive Activity in Manufacturing in the Philadelphia Federal Reserve District, published by the Federal Reserve Bank of Philadelphia. The Pittsburgh index is made up of three major groups of series: (1) the industrial production group of

fifteen series, in which iron and steel products and coal and coke form an important part; (2) the trade and transportation group, with carloadings of coal, coke, etc. and river tonnage; and (3) the group representing the value of sales in various trade lines. On the whole this index, particularly with its group indexes on industrial production and shipments, gives an excellent indication of fluctuations in production in this area.

The index for the Philadelphia Federal Reserve District illustrates the problems of constructing an index of manufacturing output in an area of highly diversified industries. The assembling for this index of forty-five series representing almost all the major lines of manufacturing activity in the District is noteworthy. Thirty of these series represent production directly, in terms either of physical volume of output or of machinery activity. A unique feature of this index is the use of inormation on payrolls or man-hours worked as a measure of manufacturing activity. Wherever used, such data are adjusted to the trend shown by figures of physical volume of production obtained from either the Federal or State Census.

These two indexes—which are excellent measures of local production—should be an incentive to similar undertakings by other agencies.

POSTAL RECEIPTS, BY F. L. CARMICHAEL

Some fifteen or twenty series of postal statistics—most of them pertaining to Denver, a few to selected groups of cities in the United States—have been studied in greater or less detail in preparation for this paper. In addition to the items comprising "postal receipts," domestic money orders issued and paid, both number and value, and value of postal savings certificates issued and paid have been included in the investigation.

Requisites of a serviceable indicator of business may be summarized as follows as a guide to the discussion:

1. The data should be available promptly after the end of the period to which they apply.
2. The series should be relatively free of irregular fluctuations.
3. The series should be sensitive to business change and at the same time comparatively unaffected by developments of a non-business character.

These criteria are necessarily of degree only. On the score of availability there is no indictment against postal statistics. From the point of view of regularity of movement and of sensitivity, however, there is much to be desired.

The various series of postal data are considered unreliable as indica-

tors of business change because of one or more of (1) frequency of rate changes, the effects of which cannot be measured statistically, (2) wide amplitude of irregular fluctuations in comparison with that of cyclical change, (3) sluggishness of response to business changes, and (4) reactions to developments that are non-business in character. A brief summary of the evidence follows:

Total postal receipts. The amplitude of cyclical swing is small. Irregular fluctuations are wide.

Postage and stamped paper sold. The response to business change is comparatively good; but the picture is marred by irregular fluctuations. A good example is the sharp drop in July, 1933, noted in the Denver data as a result of the rate change from three cents to two cents for local mailing.

Air mail, weight dispatched. The sharp rise of the secular trend renders measurement of the cyclical change difficult. There is evidence that this series may later be of value.

Postal savings certificates issued and paid. The irregular fluctuations are wide; and there is no recognizable response to business changes.

Domestic money orders issued and paid, number and value. Domestic money orders paid in Denver and in selected cities are better indicators of business movements than are the corresponding series of money orders issued. Wide reactions occur in all of these series, however, that are non-business in character. For example, sharp rises have taken place since the middle of 1932 as a result of the banking fiasco.

STATE AND FEDERAL COÖPERATION IN THE COLLECTION OF SOCIAL WELFARE STATISTICS

By Ralph G. Hurlin

In his study, *Next Steps in the Development of Social Statistics,* made for the Social Trends Committee, President Rice has provided the text for this round table discussion. Writing of the statistical functions of the federal government, he states:

> Whenever original data of national interest must be collected at short intervals from a large number of scattered sources, an intermediate agency of collection may have value. The alternative is a far-flung national organization of field workers directed from Washington. It follows that some of the major advances of social statistics in the near future are likely . . . to develop within the federal government, but in coöperation with state and local governmental agencies which have the initial responsibility for collecting the primary data. . . . In given instances, this may be accomplished by the addition of responsibilities to existing state bureaus, while in other cases totally new agencies within the state government may be required.

Notwithstanding some important developments within the past few years, we are as yet very poorly equipped with statistics of social welfare activities on a national scale. It may be helpful to review briefly the history of the development of such national social welfare statistics as we have and to outline the present organization for their collection.

In point of volume, the Census Bureau has been the chief source of compilation of these data. In connection with the federal population censuses, enumerations of persons dependent, delinquent, and defective were attempted, beginning for the blind and deaf-mutes in 1830, for the insane and feeble-minded in 1840, and for paupers and delinquents in 1850, and continuing through 1890. These statistics were obtained directly by the census enumerators at the time of the population censuses. For the most part they are not regarded as having been even approximately complete. With the census of 1900, these counts except of the blind and deaf were abandoned and instead special enumerations were made following the decennial population census in 1904. Special canvasses of these groups were also made in 1910 and in 1923, and that following the 1930 population census is now in process. These special canvasses have related to institutional populations primarily. Although they have included much valuable detailed information, they have had great defects owing to incompleteness and to lack of standardization of the institutional records from which they were derived.

In 1926, the Bureau of Census inaugurated a series of annual reports of statistics of three classes of state and federal institutions, those for

the mentally diseased, those for mental defectives, and prisons. But this series has now been interrupted.

The most important other federal bureau which has so far compiled social work statistics is the Children's Bureau. It has effected standardization of statistics of juvenile courts, and since 1927 has published annual compilations of these figures. It has also compiled national statistics of public mothers' aid in 1923, 1928 and 1931. In 1930, this Bureau assumed the collection of monthly statistics of public and private social agencies of various sorts for some 40 selected cities or city areas, which had been developed during the preceding two years by the Committee on Registration of Social Statistics. It has since added to its responsibilities the collection of monthly statistics of family relief and care of homeless men by all important agencies in about 120 cities. While extremely important, these statistics of the federal Children's Bureau are not yet of national scope. The statistics of varied social welfare activities represent a sparse sample of cities and are overweighted by large cities. The relief statistics are for a larger group of cities, but the numerous cities of under 50,000 are not included at all. The juvenile court statistics have also been chiefly urban, although a beginning has been made toward collection on a state-wide basis in four or five states.

The organization within the past year of the Research Division of the Federal Emergency Relief Administration has resulted in our first truly national statistics of relief, unless the incomplete special study made by the Census Bureau in 1931 can be so considered. Beginning operations during the past summer, this office has compiled monthly statistics of public relief expenditures, by states, from January, 1933. The accomplishment has special significance for this discussion since the collection of these data has been made through state bureaus. The state bureaus, however, have administrative responsibility to the Relief Administration, which explains how results can have been obtained so effectively. This collection of statistics, therefore, falls in the first of the four categories of federal statistics described in Rice's study for the Trends Committee, that is, they are data required by and obtained in the course of a specific administrative activity of the federal government.

Other bureaus of the federal government have produced statistics of welfare activities only incidentally. For example, the Office of Education produces periodic information concerning schools for certain disadvantaged classes and the Bureau of Labor Statistics has compiled some statistics of almshouses.

Having glanced hastily at the present state of national welfare statis-

tics, it is pertinent to ask what statistics of welfare activities might well be recorded regularly on a nationwide scale. Without attempting to demonstrate the need for these data, beyond pointing to the rapidly growing concern of this country in governmental responsibility for the disadvantaged and the trend toward increased governmental expenditure on this account, may I outline the sort of statistics which I think the state and federal governments should coöperate in producing.

What we most need in the way of welfare statistics is simple, comparable data for each important field of welfare activity, including the activities of private as well as public agencies, recording the number and characteristics of persons served, the cost of the service, and the number of persons engaged in rendering the service. Such facts are needed frequently enough to show the trends in these activities and their important short time fluctuations. For much of this material very frequent data are not needed. It would be a mistake I now believe to build up very extensive monthly reporting for all sorts of welfare agencies. While it is clear that compilation of monthly statistics is valuable in certain fields, such as relief, in many instances comprehensive annual statistics or even comprehensive data at two year intervals would answer the important need.

The following partial list of the types of agencies engaged in these activities will indicate the wide scope of the field to be covered:

1. Agencies giving service or relief to families in their homes
   - Relief and case work agencies
   - Agencies serving veterans
   - Mothers' aid offices
2. Agencies giving service or relief to children
   - Child care institutions
   - Child placing agencies
   - Child protection agencies
   - Child guidance clinics
   - Juvenile courts
3. Agencies giving service or relief to the aged
   - Old age pension offices
   - Public homes for the aged (almshouses)
   - Private homes for the aged
4. Agencies giving service or relief to the handicapped
   - Blind relief offices
   - Agencies for the blind
   - Agencies for the deaf
   - Agencies for the disabled
5. Agencies for the mentally diseased and mentally defective
   - Psychiatric clinics
   - Public and private hospitals for the insane
   - Institutions for mental defectives

6. Other agencies for medical care
   - Hospitals and outpatient departments
   - Independent clinics
7. Police, judicial and penal agencies
   - Police departments
   - Courts
   - Prisons and jails
   - Probation and parole authorities

It is entirely logical to suppose that national statistics of all these expanding activities might be supplied regularly and reasonably accurately through a well integrated system of coöperation between state and federal statistical offices. There are other alternatives. A federal bureau might employ an extensive force of field agents to operate locally in collection of this information. This would be unfortunate where state agencies are already covering all or even part of the ground, since it would result in overlapping and confusion. The collection of the data chiefly by direct correspondence is conceivable, but experience does not recommend this method. On the other hand, the advantages which might accrue from a coöperative plan are many. The states have immediate need for the information; they have, or should have, administrative or supervisory relationships with all the agencies rendering the above listed services; and collection of the data and affiliation with a federal bureau should strengthen the state agency and assist it in the exercise of its other functions.

We are not, however, in a position to put into operation such a cooperative system in 48 states at once. In the first place more definite assignment of responsibility to some federal bureau is needed. The Children's Bureau in the Department of Labor, which is most actively interested in this field at present, lacks specific instruction, and perhaps even authority, to develop these statistics, except for activities for children. It is to be hoped that the long anticipated reorganization of the federal government departments will result in the establishment in some department of a bureau specifically concerned with social welfare activities for both adults and children. Meantime, in my opinion, either the Children's Bureau or the Census Bureau should be charged with specific responsibility for developing national statistics of both public and private welfare activities.

In the second place, the development of a coöperative plan for comprehensive social welfare statistics would be impeded by the present lack of effective state departments of social welfare in a considerable number of states. An article by Marietta Stevenson in *Social Work Year Book, 1933,* is authority for the statement that as many as five states still have no state agency concerned with general public welfare activi-

ties and in two others the agency established by law is not functioning. More than half of the states do have single state departments responsible for broad programs of public welfare, but most of these have no, or at best rudimentary, statistical services. Only four have as yet developed statistical bureaus (California, New Jersey, New York, Pennsylvania).

The fact that the organization is not completely ready to hand is not, however, reason for delaying coöperation between federal and state bureaus. An excellent beginning toward a national plan might be made by developing comprehensive welfare statistics, state by state, as states were found ready to meet the requirements for coöperative activity. The data so produced, although for a few states only at first, would be of great interest and value. With this possibility in view, I would like to end this paper by offering for discussion the following recommendations, which seem to me practicable:

1. Some bureau in the federal government should at once be authorized to develop as rapidly as feasible state-wide statistics of the activities of welfare agencies, public and private.
2. This bureau should enter into coöperative arrangements with state bureaus which have established, or will establish, adequate statistical facilities for the collection of these statistics.
3. The federal bureau should subsidize or remunerate the state bureaus to the extent of at least half the cost of the collection of the data required by the federal bureau, and in return should exercise effective supervision over the work of the coöperating state bureaus, including approval of technical personnel and periodic inspection.
4. Efforts should be made to bring about standardization of the statistics in each field of welfare activity in which any data are collected and for the present the emphasis should be placed on the collection of annual rather than monthly data.

JUDICIAL CRIMINAL STATISTICS (ABSTRACT)

By L. C. Marshall

Any plan to collect judicial criminal statistics must be drawn with an awareness of three outstanding considerations: First, judicial criminal statistics must be correlated with police statistics and with penal statistics; second, in the collection of judicial criminal statistics, the policies and practices of the individual courts with respect to the reporting of civil and divorce statistics must be kept in mind; third, data should be gathered from every significant level of the court system—from the so-called minor courts which are in many respects our most important courts, from the courts of general criminal jurisdiction, and from the appellate courts.

As for the techniques involved in collecting judicial criminal statistics, distinct advances have recently been made. For one thing, a uniform classification of offenses has been worked out—one that is currently being used for police statistics, judicial statistics, and penal statistics. For another thing, classifications and definitions of statistical units have been carried to a reasonably satisfactory point in the field of the procedural outcomes in court. Finally, classifications and definitions of statistical units have been recently developed in the field of the sentence or treatment of the defendants found guilty. All this work has received an elaborate testing in actual use over a wide geographical area and over a generation of court history. It has, too, been submitted to careful examination and resultant criticism of experts.

The fields in which there remains great need of experimentation, research, and testing are: (a) personal statistics or statistics of criminals, (b) statistics of court management, (c) statistics of events prior to the formal court action upon the cases, and (d) the statistics of the minor court system.

The Bureau of the Census has gathered as of the year 1932 the statistics from the courts of general criminal jurisdiction in seventeen of our states, and the understanding is that the results are to be published in the near future. There is every reason to believe that if this work were continued, the statistics for the year 1933 would include publishable returns from more than half of our states. Unfortunately, there is reason to fear that this activity will be suspended, although its total cost has perhaps not exceeded $2,000. This would be a pity, for a few years would serve to establish a "registration area" that would put these statistics on a comparable basis for three-fourths of our states.

There would then remain the development of comparable data from the minor court system and from the appellate courts.

THE 13-MONTH BUSINESS CALENDAR [1]

The Chairman of this Round Table, Mr. W. J. Donald, introduced the subject by commenting upon the rapid growth in the use of the 13-month business calendar. He referred to a survey of the experience of companies using this system made in 1928 by the American Management Association of which he was then Director. Scarcely more than sixty companies, as far as could be ascertained, had adopted it at that time. Since then their example has been so extensively followed that the number could now probably be reckoned in the thousands.

Experience has indicated that this calendar is a big improvement on the regular calendar. The uniform four-week "months" make it possible to escape many of the accounting and statistical difficulties encountered in making comparisons by the unequal and incessantly changing months of the civil calendar, and to secure closer business control. There remain, however, various difficulties caused by the necessity of using the system concurrently with the public calendar. These seem formidable to many accountants and statisticians. It would be valuable also to have information about the adoption of the four-week period by some industries for collecting statistics under their NRA codes.

Mr. F. D. Potter, assistant comptroller of Sears, Roebuck and Company of Chicago, which adopted the 13-period system in 1930, alluded to the Report of the National Committee on Calendar Simplification, issued in 1929, which shows by a series of graphic charts, many of the discrepancies caused by (1) difference in number of days in respective calendar months; (2) difference in number of Saturdays and Sundays in months; (3) consequent difference in number of working days in various months for comparative purposes.

In the Sears, Roebuck calendar, the four-week periods are determined by fixed dates rather than by every fourth Saturday. January 1, a non-business day, is omitted, except that payroll expense for that day is included in the period preceding, and Leap Day business is included in the period beginning February 27. It was found that it was unnecessary to stick to the conventional week always ending on Saturday (as is done by some 13-period calendar users). Every national holiday consequently falls in the same period each year. The disturbance on account of Labor Day and Thanksgiving Day occurring a few days sooner or later in different years is the same as under the 12-month calendar. In budgeting the 13-period basis has made possible much in

[1] Digested by Meredith N. Stiles.

the way of improvement and refinement principally because of the greater ease with which trends can be distinguished.

With regard to the labor and expense of producing an additional accounting period, this supposedly would represent about an 8 per cent increase. Experience has proved this to be more theoretical than factual.

With respect to outside contacts no important complications have resulted because others go on the 12-month calendar. Various devices have been evolved to care for accounting difficulties as they arise.

With regard to financial reports, divisions into quarterly and semi-annual periods in a general merchandise business are relatively of little value. All figures are kept cumulatively for comparison with other years, but the weekly figures and period statements are the important data for correction and control. The principal financial statement is issued annually. A semi-annual inventory is taken and spring season financial and operating results are obtained for the first six accounting periods. The fact that there are left seven accounting periods in the subsequent fall season has proved no handicap. Results for an entire Fall Season against the entire Spring Season do not need to be compared.

With regard to introducing the 13-period calendar, there was no great difficulty in adjusting the previous year's records.

Mr. Seth L. Bush, Assistant Treasurer of the Port Huron (Michigan) Sulphite and Paper Company, who has had twenty years' experience with the system, marvels at the strength of precedent which has prevented its general adoption.

Perhaps the bug-a-boo most often raised is the accounting method of handling receivables and payables. One answer is to reconcile the receivables with their controlling account at the time of sending out customers' statements, and to depend only upon the controlling account when building the balance sheet for the four-week period. Likewise, the controlling account for the payables can be used for balance sheet purposes, and the individual accounts of vendors can be reconciled with their control at any convenient time. Reconciliation of cash with bank statements can also be made whenever the bank statements are received, without regard to the closing of the books. In actual practice, this procedure allows some leveling of the peak in the accounting department at the close of the period, and turns a seeming disadvantage into an advantage. As long as the 12-month calendar continues in general use, most payments will be made on that basis, which must be remembered in connection with financial forecast, but that creates no real difficulty in actual practice.

Twenty years ago, semi-annual or annual reports and comparisons were generally considered sufficient. Now financial statements every four weeks come none too often, and weekly statistics are common. Trade association statistics have become indispensable.

Mr. A. H. Robinson, Chief Statistician of the Eastman Kodak Company, commented that much of the discussion of the 13-period business calendar has centered around its use in the problems of distribution and its value for comparative purposes.

Prior to the adoption of this calendar by his company on January 1, 1928, the quantity sales figures were recorded weekly, which was necessary for purposes of production control. The dollar sales were reported four times during the month, with the first report covering the first seven days of the month, the second report the first to the fifteenth, the third report the first three weeks, and the fourth covering the entire month. It will be seen that the first week of any month will usually not coincide with the conventional calendar week, the first fifteen days are not exactly two weeks, and that the last report will be issued at varying time intervals, depending on the time of the month. It was impossible to compare easily dollar and quantity sales on this basis.

The Kodak Company has a well-developed and successful system of production planning, which, in spite of high seasonal variation in the sales of its products, has resulted in a production level which is substantially constant throughout the year. The success of this program is the result of refinements in methods of control. It has been found that for the production of sensitized goods a monthly control period was not sufficiently current to maintain the desired stability. The week, as an interval of time, became the basic time unit for control of the important manufacturing operations. The calendar week is convenient, not only because it provides a check on conditions at frequent intervals, but because it ties in with the actual payroll periods for the plants; the working force is paid at the end of each calendar week.

The adoption of the 13-period calendar eliminated a good deal of calculating in those weeks where the month begins and ends in the middle of the week. In spite of the necessity of making 13 statements during the year in place of 12, this saving in adapting weekly data to monthly has more than offset the increased clerical cost of one more report.

With regard to introducing the calendar, in order to avoid the difficulties of continually adjusting current figures, it seemed advisable in certain cases to go back several years and to estimate from the monthly data what the four weekly period figures would have been. In order to

do this, it was necessary to make a calendar to cover the prior period and to prorate arithmetically or graphically the monthly sales to a period basis. Methods have been devised for converting seasonal variations.

Mr. F. M. Thudson, Comptroller for the National Hotel Management Company, Inc., whose hotels operate on the 13-month basis said that successful management is largely the result of effective control, and that control is difficult unless operating figures are comparable and there comes in the advantage of the 13-month calendar. Its even, exactly balanced periods give an equitable basis for comparison.

In addition to the usual points in favor of the 13-month calendar, there are others that make it peculiarly advantageous in hotel operation. In transient hotels the volume of business differs greatly from day to day and according to the days of the week, each day having a different economic value. For instance, in metropolitan hotels the peak business of the week is done on Wednesday and Thursday. Therefore, even if two months of the present calendar have the same number of days, the fact that one has more Wednesdays or Thursdays than the other renders comparison unfair. In resort hotels business is best on week-ends and consequently a month that boasts five Sundays has the advantage over one that has only four, and comparison is practically meaningless.

Comparison is useful in business as a basis for budgeting, and, of course, the more balanced the comparisons, the more accurate the calculations. Consequently, the 13-month calendar, by furnishing so exact a gauge, makes savings possible in practically all expenses, and particularly in payroll, which, consuming thirty cents out of every dollar taken in, is the largest expense item in hotel operation.

The application of the 13-month calendar at the Hotel New Yorker is very simple. Financial statements are prepared every 28 days. The 13th period consists of 29 days, and in leap years of 30 days. The preparation of an extra statement affects the clerical force very slightly. And little or no difficulty is experienced in dealing with outsiders. Statements to guests are rendered on the calendar month basis, a plan which does not upset the accounting system in any way. Dealers cooperate and send their statements every 28 days. Public utilities alone have not been able to assist in that respect, but in most cases the hotel records—meter readings, records of telephone calls, etc.—show the consumption for the period.

As to salaries and wages, employees are paid once a week, so that every period has an equal number of pay days. As inventories are taken at the end of each period of 28 days, the accounting statements show

actual consumption. Bank statements are received every 28 days. Various service departments in their dealings with guests use the regular calendar.

Change to a 13-period basis is not very difficult so far as sales are concerned since the daily sales figures of each department are available. With regard to expenses, a different method has to be used, since exact daily costs are not available. In calculating the expenses of the last year by periods, for purposes of comparison, the expenses of each month are divided by the number of days in that month to get the average daily expenses, and this average multiplied by 28. Where a period begins in one month and ends in another, the average for the first month is applied to the days that lie in it, and the average for the second month to the days extending into it. After one year's operation under the 13-month calendar figures are exactly comparable.

Mr. W. B. Benjamin and Mr. John Thies drew evidence from their experience.

Mr. M. N. Stiles, American Secretary of the International Fixed Calendar League, said his organization had compiled a record of about 600 large companies which have adopted the four-week system, mostly since the beginning of the depression. This is but a small part of the total of large and small concerns that have made the change in recent years. About 20 trade associations have adopted the four-week period for collecting and reporting all or part of the statistical information required under their codes of fair competition, and the National Recovery Administration has been advised by the government's statisticians that the four-week period or other multiples of the week were more desirable than the calendar month for that purpose. The difficulties that have been mentioned in operating on four-week periods at present, particularly with regard to calendar month bills, caused many concerns to hesitate to adopt the system. These difficulties will remain until the public can be educated to paying bills every four weeks, or the four-week period officially established as the length of the month through reform of the public calendar.

THE REAL PROPERTY INVENTORY

By Howard Whipple Green

The Cleveland Real Property Inventory, getting under way early in October of 1932, was the first thing of its kind in the United States. Occupancy-vacancy surveys had been made at various times in numbers of communities throughout the country. Most of these surveys covered only the central city and therefore did not reveal the conditions of the entire community. Most of them presented data for the entire area covered and therefore did not divulge the enormous differences present in various parts of the area. In several cities the surveys were made at irregular periods and therefore the data were not entirely comparable. In some cities no recognition was given to the differences in types of property. It is readily seen that occupancy-vacancy surveys present at best but a small part of the vast amount of data so necessary for the intelligent understanding of the multitude of problems relating to real property.

The basis of the Real Property Inventory in Cleveland was developed in two subcommittees of the National Conference on Construction. One of these two subcommittees, that on finance, worked under the chairmanship of Raymond T. Cragin of Cleveland; the other, that on occupancy-vacancy studies, worked under the chairmanship of Howard Whipple Green of Cleveland.

The reports of these two subcommittees were submitted to the National Conference on Construction in July, 1932, by Ernest Trigg, chairman of Committee No. 4, "Committee on Local Organizations" and by S. L. Andrew, chairman of Committee No. 1, "Committee on Business Reports, Statistical and Trade Information" with the aid of the subcommittee chairmen.

The National Conference on Construction and the two sponsoring agencies, the Department of Commerce and the United States Chamber of Commerce, desirous of trying out the recommendations of these two subcommittees, and believing that Cleveland would be an ideal city in which to initiate the work, because of the enormous amount of statistical data already available in the city [1] and because the chairmen of both subcommittees were from Cleveland, influenced the formation of a committee in Cleveland which would develop the recommendations of the National Conference on Construction, as they related to the study

[1] "Population by Census Tracts, Cleveland and Vicinity with Street Index," by Howard Whipple Green.

"Population Characteristics by Census Tracts, Cleveland, Ohio, 1933," by Howard Whipple Green, published by the *Cleveland Plain Dealer*.

of the supply and demand for housing and other real property and the financing of the same.

This committee was formed with Raymond T. Cragin, chairman; Abram Garfield, vice-chairman; William Finley, treasurer; O. W. L. Coffin, secretary; Howard Whipple Green, director, and leading citizens as members of the committee. The committee membership included representatives of various groups interested in real property and in people. It was purposely created as a committee detached from any one individual group or interest in order that there could be no doubt as to lack of prejudice or influence.

The scientific study of real property was by no means a new subject for the chairman of this committee. For a number of years Mr. Cragin had been interested in the progress made in occupancy-vacancy surveys in various cities. He felt that the collection of such data in relation to the central city alone by no means presented a picture of the conditions in the entire community. He believed so thoroughly that an occasional accounting was of little use, if not actually misleading, that he had not encouraged Cleveland's organizations to undertake work of this kind until the necessary preparations were made which would insure at least an annual check carried on over a period of years. The director of the work is responsible nationally for the promotion of the creation and use of census tracts in the large cities of the United States, and the presentation of the data contained in the census in such a manner as to be of real use to business houses as well as public health and welfare organizations.

The Cleveland committee, financed through subscriptions obtained from Cleveland business establishments, was called The Committee on Real Property Inventory. Dr. Robinson Newcomb, experienced in work on various governmental projects involving similar factual backgrounds, was loaned by the Department of Commerce and the United States Chamber of Commerce to aid in the organization of the work.

Through the coöperation of Cleveland's Postmaster and the other Postmasters in the Cleveland Metropolitan District and their staffs, data were collected upon the types of all real property, the occupancy or use in October, 1932, and the number of doubled-up families. All of these data were analyzed by census tracts and with a vast amount of related data collected through other sources published in Report No. 1, "Real Property Inventory of the Cleveland Metropolitan District," by Howard Whipple Green.

The work in Cleveland was initiated on October 1st, 1932. The Cleveland Metropolitan District, including 12 cities, 28 villages, and 3 townships, was the area adopted for study. It had, in 1930, a popula-

tion of 1,194,989 inhabitants and covered 306 square miles of area. This area extends, roughly, from Mentor township in Lake County on the east to Lorain County on the west, a stretch of more than 36 miles. It was the third most densely populated metropolitan district in the United States with 3,852 persons per square mile as compared with New York City with 4,336, Chicago with 3,900, and Philadelphia with 2,865. The number of families in the Cleveland Metropolitan District was found to have increased 1,361 between April, 1930, and October, 1932, certain sections having decreased, and others having increased enormously.

The Cleveland Metropolitan District was divided into 321 small geographically constant areas or census tracts with 205 census tracts in Cleveland, 18 in Lakewood, 17 in Cleveland Heights, 10 in East Cleveland, 6 in Shaker Heights, and 65 in the other parts of the district.

The number of buildings containing family-units in each of the 321 census tracts was presented for each of 8 types of dwellings. The number of family-units, occupied, vacant, and the extra families doubled up with other families were presented for each type and for each census tract.

It was found that 9 per cent of the family-units were vacant but that when the 12,635 extra families undoubled, a vacancy of less than 5 per cent would be experienced. While 9 per cent of all the family-units were vacant, it was shown that vacancy in one-family dwellings was 4 per cent, in two-family dwellings, 8 per cent, while 22 per cent of the apartments in the larger apartment houses were vacant.

The number of office buildings in each census tract was tabulated with the number of office units, occupied and vacant; 29 per cent were vacant. The number of light manufacturing buildings, the number of floors, and the per cent vacant or over half vacant were presented; 21 per cent were vacant. Store fronts, occupied and vacant, were included and the type of store so far as the occupied units were concerned. The occupied stores were shown by 21 types and it was found that 15 per cent of the stores were vacant.

Gasoline stations, theaters, public and semi-public buildings, factories and industrial plants were tabulated for each census tract.

Vacant lots by types of zoning were tabulated by census tracts, also unallotted acreage by acres, and areas used for commercial and industrial purposes, and acreage zoned but not used for these purposes.

The characteristics of the population of each census tract were also included, presenting such factors as the population in 1930, changes during previous decade, predominating racial and nativity characteristics of the family heads, the economic status and so forth.

The number of lots created by subdivision each year in each census tract was tabulated for the period 1916–1932. This tabulation showed that in the peak year of 1926, 18,594 lots were created, followed by 8,970 in 1927; 4,689 in 1928; 2,936 in 1929; 477 in 1930; 326 in 1931 and but 169 lots in 1932. This tabulation also showed that 48 of these 169 lots were created in census tracts W-2 on the extreme west side of Cleveland, a portion annexed in 1923, and of the remaining lots, 96 were created in 4 of the 6 census tracts in the city of Shaker Heights, east of Cleveland. The remaining 25 lots were created outside of the Cleveland 5-city-area. The table showed that 157,750 new lots were created in this entire area during the 17-year period.

Family-units created and demolished were presented showing that in Cleveland proper 86 more family-units were destroyed in 1932 than constructed, 334 constructed against 420 destroyed.

Deeds and mortgages each year for 65 years for a number of Ohio counties were charter. The analysis of foreclosures for a 5-year period showed that while 21,523 properties were involved, 9,438 were vacant lots, or acreage, and only 7,415 were one-family dwellings.

During the 5-year period there were 5.6 foreclosures per 100 one-family dwellings, as compared with 21.6 foreclosures per 100 large apartment houses. Large differences were found for each type of property between the various areas and for the same type of property in any one area.

The movements of population in the Cleveland Metropolitan District have been studied and a report will shortly be published. Numbers of families moving into the district and where they came from is known, and numbers of families moving away and where they went. A total of 2,973 families left the Cleveland Metropolitan District during 1933, 1,778 to other parts of Ohio, 197 to Pennsylvania, 186 to New York, 175 to Michigan, 132 to Illinois, and 517 to other states. A total of 4,588 families came into the Cleveland Metropolitan District during 1933, 2,449 from other parts of Ohio; the others from states similar to those to which Cleveland's families moved.

The net gain for the 12-month period was approximately 1,615 families. The number of families moving into each census tract and the census tracts from which they moved will appear in tabular form and will make possible the calculation of rates of family turn over, that is, stability indices for each census tract.

In October, 1933, a second careful field study was made of occupancies and vacancies and the other pertinent data recorded to be analyzed and published in 1934.

The Cleveland Committee on Real Property Inventory did so thor-

ough a job and demonstrated so completely the value of the work that in the Fall of 1933 Real Property Inventories were included by the Civil Works Administration among other projects for which City Plan Commissions all over the United States could legitimately use CWA men and women.

In December, 1933, the Bureau of Foreign and Domestic Commerce obtained an appropriation of $2,500,000 for the purpose of carrying on a modified Real Property Inventory in 63 cities in the United States. The Federal project goes much more into the details relating to buildings containing family-units, the family-units themselves, and the families occupying the quarters than has been attempted in the Cleveland work. On the other hand it slights non-family units, simply listing such other units. Each dwelling is placed in one of eleven classes. All stores and industrial plants are listed and the vacant lots noted. The principal material of construction, the height of the dwelling in stories, the basement, the age, the number of passenger and freight elevators and the conditions of the structures are noted. The presence or absence of garages and their car capacity is recorded.

In the case of each family-unit, the type of heating apparatus and the fuel is recorded. The presence or absence of running hot or cold water and of mechanical refrigeration, is noted. The tenure of all family-units and the length of time occupied or vacant is a matter of record. The number of rooms and the number of persons living in these rooms, the number of extra families doubled up with other families and the race of each family is noted. The number of water closets, bath tubs and built-in shower baths and automobiles is recorded. The use of gas and electricity for cooking and lighting, and the length of time it takes the principal wage-earner to get to work and the usual mode of transportation is recognized. The family's inclination to "farm" is also noted. The value of owned homes and the monthly rental of rented homes in January, 1934, may be compared with the same data obtained in April, 1930, and the equivalent monthly rental determined for each census tract.

This expanded Real Property Inventory includes data of enormous significance not only to financiers, real estate people, the construction group and others directly involved in activities of this nature, but also to a broad group of other users. It answers such ever-perplexing questions as: What is the market for mechanical refrigeration, for gas and electric ranges, gas and oil heating, sanitary facilities, paint, transportation, automobiles, gasoline, seeds and shrubs? Where should chain and independent stores, factories, and industrial plants locate? What is the future of this or that location? What is the need for this or that service, or the desire for this or that activity?

The Cleveland Committee is forging ahead again into uncharted areas. Strip maps are being prepared for the main thoroughfares showing graphically each building and the street frontage devoted to each type of retail operation, service and other use.

Careful records are in preparation for each industrial plant and factory. The total area of such space in the Cleveland Metropolitan District is being determined, the extent of the competitive area that is vacant and that which is obsolete. The present use of the occupied area is being classified.

The hotel facilities of the District are being given attention and the conditions of operation and the services rendered are being analyzed.

Data of this kind once obtained are of little significance, but when collected at regular periods throughout a series of years they become the basis for sound community planning, for new construction programs and the promotion of sound business procedures.

The facts regarding real property for an entire district are of slight value until analyzed by specific small areas, and by specific types of property. The fact that 9.0 per cent of the family units in Cleveland were vacant in October, 1932, gives no indication that in two census tracts over 50 per cent of the family units were vacant, nor that in four census tracts there were no vacancies. It gives no indication of a 4 per cent vacancy in single-family dwellings nor of a 22 per cent vacancy in large apartment houses.

A total of 157,750 new lots created in the 17 years, 1916–1932, and the presence of 142,208 vacant sub-lots in October, 1932, indicate excessive activity in allotments. However, these figures do not indicate that in Lakewood, a suburb of Cleveland, where 4,228 new lots were created during the 17 years, only 985 vacant lots remain; nor do they show that 1,119 of the new lots were created between 1920 and 1930, a period in which 5,187 dwellings, as well as a number of other buildings were constructed.

The analysis of such data by small geographical areas and by types of property is thus seen to be imperative for a sound understanding of the problems of the community.

DENVER REAL PROPERTY STUDIES

By F. L. Carmichael

It was my privilege at the Cleveland session in 1930 to present a brief report upon the first "Inventory and Vacancy Survey of Real Estate in Denver." The Bureau of Business and Social Research of the University of Denver, at the request of the Denver Real Estate Exchange, has now made the survey for four successive years. The vacancy counts were taken between September 10 and September 15, so that a four-year record unaffected by seasonal changes is available.

The residential property situation has been studied in considerable detail. The inventory was compiled at the outset by residence type, size of the living unit, period in which the property was built, and by districts of the city.[1] It has since been brought up to date through examination of the records of the Manager of Revenue and of the Building Inspector. The vacancy counts were made through the assistance of the local postal authorities.[2]

This record of vacancy change has been supplemented by studies of assessed valuations and of sales for delinquent taxes.[3] The delinquency situation on January 1, 1933, is compared (by districts) with that on January 1, 1930; and changes in the assessed valuations are recorded. Clearly these and the vacancy trends are related. The purpose of this paper is to describe the effects of the depression upon these elements of the real estate situation in Denver and the relationships that exist among them. As an aid in the interpretation of the data certain facts concerning the city are presented first.

Denver is largely a city of single residences. In twenty-seven of the thirty-three districts shown in Chart I, single residences constitute more than half of the living units totals; and they are 60 per cent of all the living units in the city. They are a large per cent of the living units in B, W, and E-1. Many of the city's large homes are located in V. Apartments are more than half of the living units in L, P, and Q; and they are important also in U. Generally speaking, P is the *old* apartment house district, and Q is the *new*. Double residences are comparatively numer-

[1] This information was transcribed from "Real Estate Appraisal" cards prepared from a careful field survey conducted under the direction of Clem W. Collins, Manager of Revenue for the City and County of Denver, 1923–1931.

[2] Through the courtesy of Frank L. Dodge, Postmaster, each mail carrier was asked to record, on a form prepared for the purpose, sufficient data on each piece of vacant property on his route to enable the Bureau of Research to identify it with the inventory record, thus insuring the same classification scheme for vacancies as for the inventory itself.

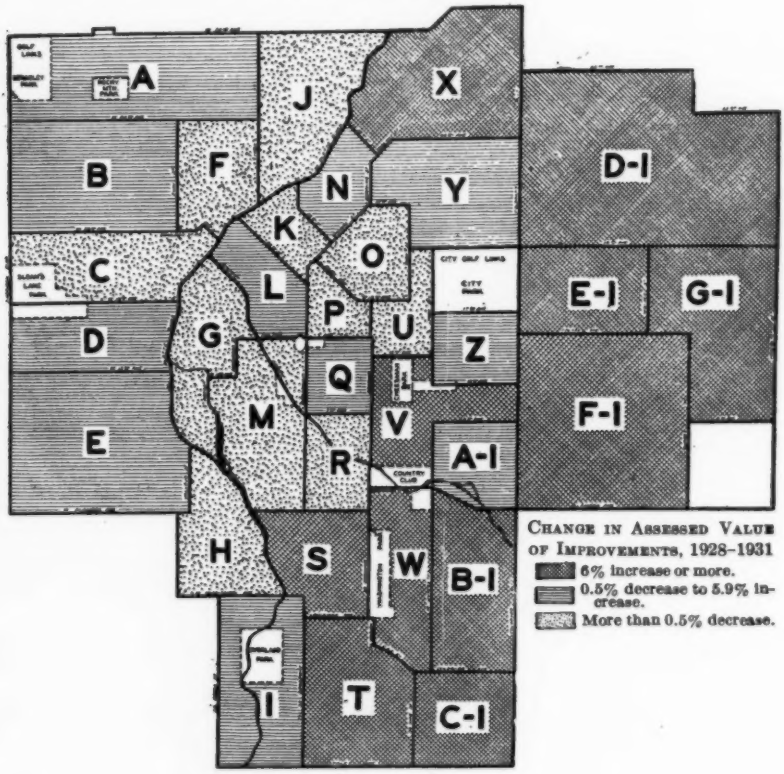
[3] Cf. "Real Estate in Denver: Assessed Valuations, Improved and Unimproved Land, and Tax Sales," *University of Denver Reports*, Vol. 9, No. 5, June, 1933.

ous in D, F, M, O, R, and S. With the exception of single residences, terraces are most numerous in M, N, and O.

District L is the central business district. The center of residential building prior to 1901 was in District L close to the boundary between

CHART I

CITY AND COUNTY OF DENVER. CHANGE IN THE ASSESSED VALUE OF IMPROVEMENTS, 1928–1931



L and P. During the past thirty-two years it has moved to the south and east. Residential properties are oldest on an average in the eleven districts C, F, G, J, K, L, M, N, O, U, and X; the eleven youngest districts are A, E, T, V, W, B-1, C-1, D-1, E-1, F-1, and G-1.

Changes in the assessed valuations of improvements—depreciation and disappearance tending to decrease the total and new construction tending to increase it—may be considered a measure of building activity. Chart I depicts the changes that took place in improvements valuations (residential and business properties combined) between 1928 and 1931.

The eleven districts with greatest percentage increases, mostly to the south and east, include nine of the eleven youngest residential districts.

Prior to September, 1931, Denver was comparatively unaffected by the depression. Because of this and the relative inactivity in building, the residential vacancy situation recorded some improvement during the year ending at this time. In response to the increasing severity of the depression, large increases in vacancy occurred during the following year. The 1933 count, however, shows that marked improvement has occurred since a year ago. The record as to consolidation of homes is similar—an increasing tendency (up to September, 1932) for two or more families to occupy the same living unit and the reverse since.

Contrary to the general trend of residential vacancies—improvement from 1930 to 1931 and the reverse from 1931 to 1932—apartment vacancies increased throughout the two years ending September, 1932. Since apartment rentals are higher on an average than those of other residence types, this may be construed as reflecting a continuous decline in the purchasing power of the people.

The apartment appears to be the most responsive also to the elements in the present situation that are making for improvement. Apartment vacancy recorded a decline of 22 per cent between 1932 and 1933—almost double that of any other type—as compared with 7 per cent for all other types combined. This suggests the desirability of further research relative to the merits of apartment vacancy statistics, compiled monthly perhaps, as an indicator of business change.

The small living unit shows greater improvement over a year ago than does the large living unit; and the former has the lower vacancy at the present time. For one-story single residences the 1933 vacancy was 2.8 per cent as compared with 3.5 per cent in 1932. Two-story single residences show an increase from 5.2 per cent in 1932 to 5.5 per cent in 1933. Apartments of two rooms or less, with no bedroom, record a drop from 14.2 per cent to 11.8 per cent. The large apartment of the no-bedroom type increased in vacancy from 13.9 per cent to 14.2 per cent. The one- and two-bedroom apartments show marked improvement; the improvement is slight in those that contain three or more bedrooms. One-story double residences record a vacancy decrease from 9.7 per cent to 7.4 per cent; two-story double residences, a vacancy increase from 12.4 per cent to 15.1 per cent. The two groups of terraces record approximately the same change from a year ago; but the two-story terrace has considerably the greater vacancy. The four-year record is summarized in Table I.

The trend toward the small living unit is well-known. It is reflected

TABLE I

VACANCY RATES BY SIZE OF THE LIVING UNIT FOR IMPORTANT RESIDENCE TYPES

Type and size of living unit	1933	1932	1931	1930
Single residence				
One-story, four rooms or less	3.3%	3.4%	3.2%	4.1%
One-story, five rooms	2.7	3.5	2.3	2.5
One-story, six rooms	2.5	3.1	2.2	2.9
One-story, seven rooms or more	1.7	3.1	2.4	3.9
Two stories, all sizes	5.5	5.2	4.5	4.6
Residence shacks	3.0	3.4	6.1	7.3
Total	*3.6*	*3.9*	*3.3*	*3.8*
Apartment				
Two rooms or less, no bedroom	11.8	14.2	12.9	13.8
Three rooms or more, no bedroom	14.2	13.9	19.1	16.6
One bedroom, all sizes	14.0	18.5	15.0	12.8
Two bedrooms, all sizes	12.6	17.6	15.0	11.7
Three or more bedrooms, all sizes	12.5	13.3	14.0	10.2
Rebuilts, all sizes	11.3	14.6	12.3	12.3
Total	*12.9*	*16.4*	*14.1*	*12.9*
Double residence				
One-story, all sizes	7.4	9.7	6.6	7.3
Two or more stories, all sizes	15.1	12.4	9.3	10.5
Total	*9.4*	*10.4*	*7.1*	*8.1*
Terrace				
One-story, all sizes	14.5	14.0	11.9	14.7
Two or more stories, all sizes	19.1	18.8	14.4	19.0
Total	*16.5*	*16.0*	*12.9*	*16.5*

in Denver's residential building for twenty years past. Although many of the older single residences have been remodeled as rebuilt apartments, there is still a relative over-supply of the large living unit.

Residential properties built prior to 1901 record a 6 per cent decrease in vacancy; those built from 1901 to 1915, a 10 per cent decrease; from 1916 to 1925, 20 per cent; and from 1926 to date, 34 per cent. Moreover, the lowest vacancy among the four construction periods—for each of the residence types—is that of properties less than eight years old. This clearly indicates an increasing demand for homes of modern construction. It suggests that new building, carefully planned as to location within the city and type of residence, may soon be required. Table II gives the four-year vacancy record by construction periods and by residence types.

The better residential sections of the city suffered heavy increases in vacancy during the two years ending September, 1932. At the same time there was a tendency for the poorer residential sections to fill up. This trend has now been reversed; marked improvement has occurred during the past year in the vacancy situation of the better residential sections of the city.

Business vacancies are recorded in terms of the frontage of properties

TABLE II

VACANCY COMPARISONS, 1930–1933, BY PROPERTY AGE-GROUPS
(All districts combined)

Residence type and date	Percentage vacancy of properties constructed				
	Prior to 1901	1901 to 1915	1916 to 1925	1926 to date	In the four periods
Single residence					
September, 1933	4.9	3.4	2.6	2.3	3.6
September, 1932	5.1	3.1	2.9	4.1	3.9
September, 1931	4.4	2.3	2.4	3.1	3.1
September, 1930	5.4	2.5	2.6	2.9	3.6
Change, '32 to '33 (%)	*— 5.9*	*+ 9.7*	*—10.3*	*— 43.9*	*— 7.7*
Double residence					
September, 1933	12.1	9.6	5.2	4.5	9.4
September, 1932	11.3	10.9	8.9	6.6	10.4
September, 1931	10.9	5.9	4.0	3.8	7.1
September, 1930	12.3	6.9	4.0	6.0	8.1
Change, '32 to '33 (%)	*+ 7.0*	*—11.9*	*—41.6*	*— 31.8*	*— 9.6*
Two-family residence					
September, 1933	7.5	8.6	3.0	0.0	7.2
September, 1932	8.9	7.5	2.3	8.3	8.4
September, 1931	6.9	7.5	3.1	10.7	7.0
September, 1930	8.6	8.2	3.1	2.5	8.1
Change, '32 to '33 (%)	*—15.7*	*+14.7*	*+43.5*	*—100.0*	*—14.3*
Terrace					
September, 1933	16.1	17.4	10.1	3.0	16.5
September, 1932	15.9	16.6	8.7	6.7	16.0
September, 1931	14.1	11.7	4.3	0.0	12.9
September, 1930	18.2	14.4	4.3	0.0	16.5
Change, '32 to '33 (%)	*+ 1.3*	*+ 4.8*	*+16.1*	*— 55.2*	*+ 3.1*
Apartment (exclusive of rebuilts)					
September, 1933	14.6	15.6	13.9	9.2	13.2
September, 1932	16.2	21.1	18.4	11.8	16.9
September, 1931	16.8	15.1	14.7	12.0	14.5
September, 1930	17.2	13.9	12.9	8.6	13.1
Change, '32 to '33 (%)	*— 9.9*	*—26.1*	*—24.5*	*— 22.0*	*—21.9*
Rebuilt apartment					
September, 1933	11.5	10.6	17.1	0.0	11.3
September, 1932	14.6	13.5	18.6	21.7	14.6
September, 1931	13.2	8.0	15.7	17.4	12.3
September, 1930	13.7	7.7	2.9	0.0	12.3
Change, '32 to '33 (%)	*—21.2*	*—21.5*	*— 8.1*	*—100.0*	*—22.6*
Residence shack					
September, 1933	3.1	3.2	2.6	1.6	3.0
September, 1932	3.5	3.1	3.9	1.7	3.4
September, 1931	6.5	5.0	7.0	0.0	6.1
September, 1930	6.8	8.5	8.1	1.7	7.3
Change, '32 to '33 (%)	*—11.4*	*+ 3.2*	*—33.3*	*— 5.9*	*—11.8*
All types combined					
Change, '32 to '33 (%)	*— 5.9*	*—10.5*	*—20.4*	*— 33.8*	*—13.0*

whose ground floors are unoccupied.[1] The response to the depression has been similar to that of residences—a decrease in vacancy from 1930 to 1931, a sharp increase to 1932, and a small decrease (smaller than that of residential properties) to 1933. The central business district, however, is to be contrasted with the outlying sections of the city. The former records an increase in vacancy each year; with the exception of the year ending September, 1932, the latter shows improvement each year.

[1] The compilation includes properties designated on the "real estate appraisal" cards as stores, banks, office buildings, public garages, theaters, restaurants, and warehouses.

The tendency for businesses to move into properties with lower rentals is reflected in the central district as well. The high-rent section shows a vacancy increase each year, whereas there is a tendency since a year ago for the fringe of this section to fill up.

The "block books" on file in the office of the Manager of Revenue are the source of the data on tax delinquencies. Blocks and other areas are indicated; and assessed values of both land and improvements are shown for all parcels in the city, a parcel of land being one or more contiguous lots or other undivided area under the same ownership. Notations are made of the properties sold for taxes in a given year and of those owned by the county by virtue of delinquent taxes in earlier years.[1]

Tax sales, as the term is used here, consist of transfers to the county because of delinquent taxes as well as sales to outside buyers. Property is referred to as "county owned" as soon as it is taken over by the county, although the owner cannot be dispossessed or a deed issued for a period of three years. Improvements consist of buildings of all kinds; paving of streets and alleys and other "special improvements" are not included.

Property amounting to 6 per cent of the city's total assessed valuation was sold for delinquent 1931 taxes. Approximately 35 per cent of it was land and 65 per cent improvements. One per cent of the city's total, mostly land, was already held by the county by virtue of former tax sales. This represents a trebling of tax delinquencies between 1929 and 1932. Delinquencies run as high as 19.5 per cent (land and improvements combined) in the outlying sections. For land the maximum percentage is 34.4 per cent; for improvements, 13.6 per cent.

Of the properties offered for sale in 1929 outside buyers were found for 45 per cent, the remainder or 55 per cent being taken over by the county. In contrast, it was necessary in 1932 for the county to take over 87 per cent of the properties on which taxes were delinquent.

The trends of recent years afford a means of appraising the wisdom of expansion policies followed in the various districts of the city. The assessed valuation of improvements in District Q, for example, shows an increase of 3 per cent, largely as a result of apartment house construction during the three-year period. The improvements sold for taxes in 1932 combined with the county owned and the three-year change that took place in them are larger percentages of the improvements total for the district than is the case for the city as a whole.

[1] Assessed values—total of all properties, properties sold for delinquent taxes, and the county owned, both land and improvements—were transcribed from these records and compiled by districts of the city. This was done for 1928 and 1931. The sales for delinquent taxes of these years took place in the latter part of the following year in each instance.

Residential and business vacancies showed greater percentage increases during the two years ending September, 1932, than in the city as a whole. These facts may be considered as reflecting over-building in this district in recent years, a situation materially affected, of course, by the severity of the depression.

Closely related to the incipient tax strike is a rent strike which realtors are apparently threatened with at the present time. New construction has been far below normal requirements, however, for a number of years; and there is an increasing demand, as indicated by vacancy trends, for homes of modern construction. Moreover, the greater willingness of the people to assume obligations in terms of the future is reflected in a sharp increase in the number of marriage licenses issued. There are thus many elements in the present situation which point to improvement in real estate in Denver.

THE USE OF FAMILY EXPENDITURES IN COST-OF-LIVING INDEXES[1]

By Helen R. Wright

The cost-of-living index was a war baby that has survived the post-war adjustments and appears to be taking on new vitality in these days that some are pleased to call a war on depression. From the beginning of its history it has been constructed on the basis of data obtained from family expenditure studies often unfortunately called cost-of-living studies. Curiously enough, however, there has been little discussion of the requirements that should be met by such studies if they are to be useful for this purpose. It is worth thinking about those requirements, not only because there is a real possibility that a new comprehensive study of family expenditures may be undertaken with one of its primary purposes to provide weights for a new cost-of-living index, but even more because it is certain that here and there throughout the country by this agency or that a number of such studies will be made during the next ten years. These small local studies have not up to this time played a rôle in the construction of cost-of-living indexes. But if cost-of-living indexes are to be improved and to be made as good as other indexes in current use the local studies will have to be used in the future as they have not been in the past. Data about family expenditures are needed not once for all in the life of the index; they are needed currently, to serve as guides in making necessary minor modifications in the index and in deciding when the base year is so out of line with current consumption that a new base should be chosen. The local studies, it may be assumed, will not be made primarily to provide the necessary data for this purpose. But if the requirements to make them useful for the index are clearly set down, some of them can meet the requirements with little or no additional work. This paper is concerned with setting down the requirements for such studies; it is merely a first attempt in this direction.

Among the requirements, not now properly met, or even adequately considered, in most local studies are:

(1) Representativeness of the sample in the group intended to be represented by the index. For this purpose there is need of studies of differences in expenditures among different income groups, as they affect cost-of-living indexes. Meantime, small local studies should be confined to limited, homogeneous groups.

(2) The sample should be large enough to give stable averages in all

[1] Summarized by the Chairman of this session, Aryness Joy.

the items that affect the index. This has rarely been done in American studies.

(3) Sufficiently detailed records of expenditures should be obtained to show both quantities and values of purchases of specific commodities, e.g., plate beef and sirloin steak, rather than for commodities in groups, e.g., meats or foods. This is essential to determine what types of commodities are to be priced and included in the index. Need for additional detailed specifications is greatest in the miscellaneous items, least in foods. The assumption that prices move with well known, standardized prices of other commodities is less justified for miscellaneous expenditures than for unknown items in the food group, for example. It is clear that the index maker will not price every item; nor can an attempt to get all the trivia succeed—only the more important can be covered. The best procedure for studies based on estimates is to concentrate on quantities and costs of commodities that have a chance of being important and not to bother too much about shoe strings, matches and hairpins. This means that estimates of expenditure will not balance with family income. This may be trying to an accountant, but an index demands correct proportions, not correct absolutes.

(4) Goods produced at home and acquired as gifts are often wrongly included with purchases. Cost-of-living indexes should register changes in costs of goods purchased, not goods used, although information on value of goods acquired without money expenditure may be useful for other purposes.

(5) With regard to housing for home owners, it seems to me clear that an index should make some attempt to measure changes in expenses met by those who own or are buying their homes, wherever home owners form a significant proportion of the group. Rent alone badly misrepresents changes in housing expenses of home owners.

Experiments with methods of collecting these data should be made. Collection from individual families, both by personal interview and by account keeping are familiar. Other variants of the account method might be tried, as well as estimates based on national consumption data for standardized commodities. I should like to register my personal opinion that family expenditure studies made along traditional lines may be much better adapted for use in the construction of cost-of-living indexes than they have hitherto been, but that in the future ways will be found at least to supplement the data so gathered, and that relatively less reliance will be placed on these data in the making of indexes.

REVISING THE WAGE EARNERS' COST-OF-LIVING INDEX[1]

By Margaret H. Hogg[2]

The construction of a cost-of-living index has three essential parts. First, the selection of a list of definitely specified commodities and services, required by families, for which prices are to be obtained; second, selection of cities, and of outlets in those cities, from which such prices are to be obtained and made into index numbers; third, expenditure weights have to be computed which shall be applied to the price indexes.

When the index is to be a wage earners' index, the procedure is, of course, to price commodities and services usually bought by wage earners, in the grades usually bought by them, and at such stores as they usually patronize. The expenditure weights are constructed to represent the annual expenditures of wage-earners' families. Families consisting of a man wage-earner, his wife, and at least one child, with or without other family members, are usually studied for this purpose; other types of family are less common and are apt to have distinctly different apportionment of expenditure.

We have to consider how far the Index of the Bureau of Labor Statistics attains this object, or how far an amended index can do so, which can be constructed from information now available. A stock-taking of this kind is needed periodically for every statistical series. One handicap suffered by this index, and shared by many other statistical measurements, is the circumstance that the original collection of material was not begun for the present purpose. Another handicap is the comparatively meager knowledge about cost-of-living data which was available when the index was started. Probably a stock-taking in detail would have been made before 1929, had it not been felt that a new budgetary investigation was a prerequisite in order to evaluate consumption changes since 1918. Such an investigation would have occurred before now but for the depression. But we are now faced with the realization that for some time there can be no budgetary investigation which can be depended upon to show reasonably stable consumption habits. Consumption is certainly distorted during a sharp depression and even immediately afterward.

The examination I have so far made of data and procedures in the

[1] Summarized by the Chairman of this session, Aryness Joy.

[2] Summary of a study in process under auspices of the Committee on Government Statistics and Information Services. Acknowledgment is due to the Bureau of Labor Statistics which has opened its records, and obtained verbal accounts of procedures from its personnel, Margaret Klem for her work on present procedure, and to Dr. John Cover, Dr. Faith Williams and their respective staffs for light on the problems of price-collection and budget analysis, respectively.

present index has shown that there are many and varied features distorting it and that it would be foolhardy to hazard a conjecture concerning their net effects. Caution in conjecture is instilled by recent experience concerning assumptions that we used to make in earlier days. It has often been assumed, for instance, that evidence on distribution of expenditures in different social economic groups would give sets of expenditure weights by which we could construct a whole set of cost-of-living indexes from the same price data. The recent collection of prices in Washington, D. C., shows that price indexes of different grades of the same article do not always move alike, hence different price data would have to be collected for the different indexes; that the selection of stores for pricing purposes may have serious effects, and that the coverage that has been usual needs to be increased. Yet again, we have been inclined to assume comfortably that an index has stability not easily upset by modification of weights. I showed in 1931 how a distortion of the group weights in the index had brought the general index 7.7 units too high in 1920; a short time ago I discovered that if the items that appear in the food index from 1913 to 1920 were weighted for those years as they are for subsequent ones, the food index for December, 1920, would be raised five units, and all subsequent data would naturally also be raised to correspond. Again, it was evidently assumed in 1918, that if budgetary data were collected from cities well scattered over the country, the representativeness of the results would take care of itself, or at least no unrepresentativeness would be sufficient to be serious. The same is true of the selection of inland price-reporting cities to supplement the original price-reporting ports. In both these cases the optimistic assumption is now seen to have been unjustified.

First, regarding the selection of a list of commodities for pricing in the current indexes; some are now missing which form an appreciable part of family expenditure (expenditure connected with automobiles is one of these); some types of expenditure are represented by articles which are not suitable now, whether or not they were in 1918 (instances are single pieces of furniture instead of sets, and cotton stockings for women instead of rayon or silk); some articles have inadequate specification, and rather haphazard substitutions have been made which disturb the price sequences (this has happened in the clothing group and with rents).

Second, we must examine the selection of cities and of outlets for price reporting. The original price reporting was set up for governmental purposes for ports only, other cities being added later. The choice was not suitable for the present purpose, the South is over-represented, and the North Atlantic States much under-represented. In the selection of

stores there seems reason to believe that procedure has not been uniform in all cities, and that in some cities stores of unsuitable types may have been chosen. Analysis of the prices recently collected in Washington, by Dr. Cover for the Consumers' Advisory Board, will help to indicate the degree of importance that this matter is likely to have.

In these two first essentials of the index, revision of procedure can be made from data now at hand, or at least fairly readily obtainable. Immediate action on them will enable us to construct a reliable cost-of-living index back to the present date, as soon as conditions shall have steadied sufficiently to make reliable expenditure data obtainable. Consumption habits are at present too much upset for a cost-of-living survey to yield normal expenditure weights.

As regards the third essential, expenditure weights, those used at present are unsatisfactory. If they had originally been representative, they would by this time be in need of some adjustment, but they never were representative by the standard of representativeness now proved to be necessary. To correct all the expenditure weights as best possible with the evidence now existing would be a tremendous task, and the results would only be a makeshift, because only sparse numerical data exist on recent family consumption changes, and because on earlier consumption, and on intervening price changes, much of the Bureau's data has been destroyed.

Final recommendations to the Bureau regarding the revision or continuation of these indexes, pending a comprehensive budgetary study, cannot be made until additional work has been done. Tentatively, it seems desirable, in the near future, for the Bureau to go on publishing food and fuel prices and price indexes for the cities now reporting, to construct and possibly publish indexes for other commodities comparatively well standardized but not now included, and to enlarge the reporting system if possible in the under-represented regions. It is doubtful if it is desirable to publish cost-of-living indexes for separate cities. They might be published provisionally pending computation of new expenditure weights for the country as a whole, and for geographic regions, the geographic regions now used being subdivided for this purpose where there is evidence of general cleavage in consumption habits within existing regions. For example, the Rocky Mountain States should be separated from the Pacific States, as they have sharply contrasted food consumption. To make these regional indexes, partial data are now available for the cities studied in 1918 which could be combined regionally by means of representative weighting for those cities, modified for subsequent consumption changes so far as there is evidence which justifies this. Regional indexes will then be weighted for combination into

a general United States index. To construct expenditure weights for regions is itself a big task. To do so for 33 cost-of-living cities, with so much less data to generalize from in each case, would be an undertaking greater than could be justified by the results. The present city indexes suffer from various distorting forces, such as rent being given far too low a weight and some other groups far too high; the use of food quantities from only five geographic regions, misrepresentative of certain parts of those sections; quantity weights applied to foods for which prices are obtained do not represent similar foods which are not priced but which fluctuate in the same way. Some corrections can probably be made in a tentative way from existing data by computing regional expenditure weights from 1918 expenditures for many regions; by subdividing miscellaneous expenditures; by tabulating clothing expenditures by cities from 1918 data, rather than by north and south alone—since sharp contrasts exist. Probably some information could be found to supplement the inadequacy of this, so that fairly satisfactory regional weights could be constructed. For some groups, however, all 1918 tabulations have apparently been destroyed; fortunately, the expenditure groups with poorest information are those with least weight in the general index. When the regions are combined to give an index for the United States, the group weights will be different from those in the present index; this is inevitable because the present index, official or adjusted, has misrepresentation of the different regions. Moreover, the price indexes for the United States will be changed because of the uneven representation of different regions by the price-reporting cities.

Reconstructing the revised indexes backwards will be a slow process, and the destruction of price data for many of the earlier years would probably make proper revision impossible over a considerable period. Even where the price data remain, the procedure has been such that subgroup indexes can be obtained only by starting again from the raw material. However, in spite of all, I believe we can improve the index currently, and, still more important, we can certainly get current information ready for future improvement. I believe the first obligation, in this field, of the Bureau of Labor Statistics is to maintain and make accessible price series and price indexes for the commodities and services that can appreciably affect a cost-of-living index. If this is done, with occasional additions and subtractions to the items as new commodities assume sufficient importance or old ones lose it, we shall always be able to construct proper cost-of-living indexes from the most recent data on consumption. Revising the index, which will always be periodically necessary, will then become a minor operation instead of a major one.

One other change in the cost-of-living index which does not require

revision of the component parts is tentatively suggested. The presence of seasonal variation in a cost-of-living index is not strictly logical, since the indexes as constructed measure the cost of family consumption such as occurred during a whole year. Therefore, it is not logical to use prices which have a seasonal variation from their average. The June Index, for example, should surely be founded on an estimate of the cost of living for a year to come or else for a year centered about the June date, not an estimate of the cost of buying the whole year's consumption at the present seasonal prices. Thus it seems desirable that in constructing the cost-of-living index, the constituent indexes should first be adjusted for seasonal variation. Then the index would represent the current estimate of the family expenditure during the year, the expenditure being reckoned from prices when consumed and not prices for the whole year's expenditure at one date. The constituent indexes, however, should be given in their natural form, showing the full seasonal variation.

MEASURING CHANGES IN THE COST OF LIVING OF FEDERAL EMPLOYEES LIVING IN WASHINGTON [1]

By Faith M. Williams

An Act of Congress of March 20, 1933 (H. R. 2820) entitled "An Act to maintain the credit of the United States Government," directs the President to reduce salaries of Federal employees in accordance with the reduction in the cost of living until that reduction equals fifteen per cent of basic salaries (i.e. salaries in force when the act was passed). The law includes the following section:

> The President is authorized to investigate through established agencies of the Government the facts relating to the cost of living in the United States during the six months period ending June 30, 1928, to be known as the base period, and upon the basis of such facts and the application thereto of such principles as he may find proper, determine an index figure of the cost of living during such period. The President is further authorized to make a similar investigation and determination of an index figure of the cost of living during the six months period ending December 31, 1932, and each six months period thereafter.

To ascertain the facts relating to the cost of living of Federal employees in the six months period ending June 30, 1928, and at the present time, it was necessary not only to ascertain changes in prices, but also to ascertain the quantity and cost of the goods and services Federal employees bought at the earlier date. Existing studies of expenditures were not sufficiently comprehensive to use for this purpose; and the complicated nature of the task set by the law made it obvious that a new study of expenditures was necessary.

President Roosevelt referred this section of the Act of March 20 to the Secretary of Labor for action, and she in turn asked the Committee on Government Statistics and Information Services of the American Statistical Association and the Social Science Research Council for technical advice on the problem. The Committee had the assistance of Professor Helen Wright of the University of Chicago in the initial stages of the plan. The investigation became a coöperative project of the Bureau of Labor Statistics of the Department of Labor and the Bureau of Home Economics of the Department of Agriculture. These Bureaus had the advice and assistance of the Committee on Government Statistics, and the Consumers' Advisory Board of the National Recovery Administration. The Women's Bureau, and the Children's Bureau of the Department of Labor, and an Interdepartmental Committee on Retail Prices coöperated in the field work.

[1] Summarized by the Chairman, Aryness Joy.

The changing price level made it an inopportune time to investigate the expenditures of all the government employees throughout the nation, even if time and money had been available for such an investigation. It was decided, therefore, to make an original investigation of the expenditures of only those Federal employees living in Washington. This investigation would provide weights for indexes of the changes in the cost of living of the employees in that city, which could be used in connection with the index for the cost of living of wage-earners for the entire United States in settling the salary question. It was planned that the investigation of family expenditures should be in the nature of an experiment, valuable for future studies.

The first step in the investigation was to ascertain how Federal employees in Washington live and what are their financial responsibilities. According to the Civil Service Commission there are at the present time almost 66,000 employees on the permanent payroll of the Federal Government working in Washington. The latest official figures on the salaries of Federal employees come from a report of the Bureau of the Budget.[1] They show average earnings of permanent employees in the executive departments (both in Washington and in the field service) and in the postal service as $1,901 in 1932. The average earnings of those with salaries under $2,500 were $1,684, and of those earning $2,500 or more, $3,264. No material was available on living arrangements and financial responsibilities for the Federal employees as a whole, or for those living in Washington.

A questionnaire was distributed among all Federal employees in Washington asking for sex, civil service classification, basic salary rate, length of residence in Washington, type of living arrangement, type of family, number of children in family, whether or not there were boarders in the family, whether or not the employee was making regular contributions to relatives not now living in his or her household, whether the home was rented, owned clear or mortgaged, and whether he or she had a written record covering all or part of his or her expenses in the period 1928–33. The returns from these questionnaires are summarized as regards salary and living arrangements by Civil Service groups in Table I.

Among employees earning less than $2,500 there is a great variety of family types. To obtain an adequate random sample from so heterogeneous a group as the Federal employees in Washington, would have cost much more than the available funds or the time would allow. It was accordingly decided to investigate the expenditures of the chief

[1] Message of the President of the United States transmitting the budgets for 1934. United States Government Printing Office, Washington, 1932, pp. a223–a225.

TABLE I

DISTRIBUTION OF FEDERAL EMPLOYEES WORKING IN WASHINGTON, BY BASIC SALARIES[1]

Salary groups	Employees living—						Employees not reporting living arrangements	Total
	As single individuals	In family groups						
		Custodial service	Clerical-mechanical and unclassified services	Clerical-administrative fiscal service	Sub-professional	Professional service		
	Number	Number	Number	Number	Number	Number	Number	Number
Under $1,500	2,857	3,844	1,990	3,335	571	14	384	12,995
$1,500–1,999	4,538	868	2,254	9,063	618	28	413	17,802
$2,000–2,499	1,516	145	2,958	2,701	415	474	125	8,334
Total under $2,500	8,931	4,857	7,202	15,099	1,604	516	922	39,131
$2,500–2,999	723	39	1,807	1,613	194	723	49	5,148
$3,000–3,499	238	4	310	669	41	954	10	2,226
$3,500–3,999	114	0	68	549	6	564	11	1,312
$4,000 and over	218	0	114	633	52	1,724	15	2,756
Total over $2,500	1,293	43	2,299	3,464	293	3,965	85	11,442
Grand total	10,224	4,900	9,501	18,563	1,897	4,481	1,007	50,573

[1] According to returns from a questionnaire circulated in Government Departments in September, 1933.

types of family organization and civil service classification within the important salary groups, selecting individual cases by lot from within these representative groups.

The following types of employees were selected for study:

1. Basic salaries between $1,000 and $1,500.

   Employees in the custodial service, with families consisting of husband and wife and children under 16 years old, and sometimes others, with one or more contributors to the family income. The initial questionnaires showed a great preponderance of families in the custodial group with only one contributor to the family income, but when the field workers began to visit families whose questionnaire had been so marked they found in a great many cases that other members of the family were actually contributing to the income for all or part of the year. Since general knowledge of family organization in this group makes it seem reasonable that the family with more than one contributor to income is representative, it was decided to include the families of Federal employees in the custodial group with two wage earners, as well as those with only one wage earner.

2. Basic salaries between $1,500 and $2,000.

   a. Single individuals living in rented rooms, selected at random from all branches of the civil service.

   b. Men employees in the clerical-administrative-fiscal service with families consisting of husband and wife only, and husband, wife, and children

under 16 years old, and sometimes others, the husband being the sole contributor to the family income.

c. Women in the clerical-administrative-fiscal service with families consisting of husband and wife only, both contributing to the family income.

d. Women employees in the clerical-administrative-fiscal service, the sole support of at least one child under 16 years old.

3. Basic salaries between $3,000 and $4,000.

Families of men employees in the professional service with families consisting of husband and wife only, husband and wife and children under 16 years old, and sometimes others.

No families taking boarders were included in the investigation, and no families with more than two lodgers. All the employees from whom data were secured had lived in the District of Columbia during at least nine months of the fiscal year 1932–33 and were employed by the Government in Washington during the first six months of 1928.

Field workers visited these employees and their families asking for information in detail on the quantity and cost of the items entering into the living of the individual or the family, in the years ending June 30, 1933, and June 30, 1928. Complete figures for the year 1932–33 and fragmentary data for 1927–28 were secured from: 123 Federal employees living as single individuals, 104 families of employees with basic salaries from $1,000 to $1,500, from the custodial group, 127 families of employees with basic salaries from $1,500 to $2,000, from the clerical-administrative-fiscal group, and 105 families of employees with basic salaries from $3,000 to $4,000 from the professional group.

It was found that 18 per cent of the employees in the professional group, and 9 per cent of the men and 7 per cent of the women in the clerical group had written records of their living expenses for all or part of the period 1928–33, and names were drawn by lot from these account-keeping groups to give them proper representation in the sample.

The information obtained in personal interviews was supplemented by a questionnaire sent to 4,000 employees whose names were chosen by lot from the entire group, asking them for specific figures on their expenditures in the year 1927–28. In constructing weights which would represent the purchases of Federal employees in the first six months of 1928, figures on quantities purchased in 1927–28 were available for some items either from the schedules filled out in personal interviews, or from the questionnaires which asked for data on 1927–28 expenditures, or from both. In general, however, the weights were calculated as follows:

Average expenditures in 1932–33 as shown by the schedules obtained in personal interviews were summarized by groups of items for which prices are known (or estimated) to move together. Average prices for January, 1928, and December, 1933, to represent each group were re-

duced to relatives with December, 1933, as a base. These relatives were used to compute expenditure figures which would be representative of expenditures in 1928 if it could be assumed that the quantities purchased were the same at the two periods. The quantity weights to be used in computing the index were calculated by dividing each computed expenditure figure for 1928 by the appropriate average price for 1928. The resulting quantity figures were adjusted by comparing them with the average quantities purchased in 1932–33 and 1927–28 as shown by the schedules, with figures secured by the questionnaire on 1927–28 expenditures, and with information as to the purchases of families of similar economic status in the years from 1927–29, from the Bureau of Labor Statistics studies of Federal employees in 5 cities in 1927–28, and the Bureau of Home Economics study of families of the business and professional groups in 1927.

In my opinion a cost-of-living index should be computed at least quarterly, and the weights for each quarter should represent consumption in that quarter. Some goods which are so important in the year's purchases that they must be included in a cost-of-living index are not available for pricing all year round, and others because of seasonal differences in human needs, or because of seasonal price variations are purchased in different amounts at different times of year. However, the information available on seasonal differences in purchases is very fragmentary. It would doubtless have been possible to prepare weights which would approximate average purchases of food, clothing, fuel and light, furnishings and equipment, transportation, recreation, and education at different seasons of the year from data available on retail sales and on family purchases, but it would have been a long process because the data to be used in making such estimates were not readily available. The indexes computed in the present investigation have, therefore, been calculated on the basis of average annual expenditures, except in the case of fresh fruits and vegetables and of clothing, where seasonal differences could not be ignored.

A separate list of fruits and vegetables was prepared for each month, with different weights for each month, the items included and the weights depending on shipments into Washington markets. These weights have been calculated on the assumption that, on the average, the same amount is spent for fruits and vegetables for every month throughout the year, but that purchases are differently distributed at different seasons between canned and fresh products and between fresh products of different kinds.

In computing Federal employees' indexes for December, 1933, the clothing section was based on the aggregates resulting from multiplying

the lists of year-round and winter clothing by their prices in January, 1928, and December, 1933. To give clothing expenditures a proper weighting in the all-commodities index it was necessary to add to the aggregates for winter and year-round clothing for each period an aggregate representing expenditures for summer clothing. Accordingly clothing expenditures in 1927–28 were computed by assuming that prices of summer clothing had changed by the same percentage as prices of year-round clothing.

The indexes showing the relative cost of living of Federal employees will not have the same groups of items as the Bureau of Labor Statistics index of the cost of living of the wage-earning group. They will have no miscellaneous item, but will present separate figures on changes in the cost of food, housing, household operation, clothing, furnishings and equipment, personal care, medical care, recreation, education, life insurance, and the compulsory contributions to the Federal retirement fund.

Separate indexes were computed for all employees, and for employees living as single individuals, and employees of three different types living in family groups: custodial employees with basic salaries under $2,500 (the majority of whom are Negroes), other employees with basic salaries under $2,500, and employees with salaries of $2,500 and over. The weights for the four indexes differ strikingly, partly because of differences in the income of the groups to which they apply and partly because of differences in size of family. The price quotations used for important items of clothing, furniture, personal service and medical care also differ from one index to another, depending on the quality of these goods and services purchased in 1927–28 by the group to which the index applies.

The indexes for December, 1933 (using prices in January, 1928, as 100) are as follows: all employees, 85.4; employees living as single individuals in rented rooms, 88.0; custodial employees with salaries under $2,500 living in family groups, 83.4; other employees with salaries under $2,500, living in family groups, 85.1; and employees with salaries of $2,500 and over living in family groups, 85.0.

A report is now in preparation which will present in detail the data on the family expenditures of the Federal employees studied and the method of computing the indexes of their living costs.

ADEQUACY OF THE SAMPLE IN BUDGETARY STUDIES

By Hugh S. Hanna

The problem of size of the sample to be used in budgetary studies has not received as much attention as it warrants; its importance lies in the fact that budgetary surveys are extraordinarily expensive. It is probably conservative to say that the securing and compiling of family-budget schedules, in the detail and with the accuracy that is desired by everyone, costs not less than $40 per schedule and possibly considerably more. At such a cost it is hopeless to expect that any such inquiry for the United States or for any significant subdivision thereof, can ever approach universality. We have had to depend, and will have to depend, not only upon the sample method but upon comparatively small samples. Take, for example, the budget survey of workingmen's families made by the United States Bureau of Labor Statistics in 1918–1919. This was by far the most ambitious inquiry of its kind ever made in this country. It cost more than $450,000. It secured schedules for approximately 12,000 families, located in 92 communities in 42 states. As a result of this territorial spreading, the number of schedules per community was quite limited—varying downwards from 518 in New York City to 52 in Everett, Washington. This meant that the ratio of the sample to total workingmen's families was, as a rule, less than 1 to 1,000 and in many cases considerably less. Are samples of such size sufficiently large to be representative? Or, on the other hand, are they larger than necessary?

In the budgetary surveys so far made, the size of the sample has been, I believe, conditioned solely by the time and money available. The available mathematical formulae dealing with chance selection, etc., do not seem to be of much help in determining representativeness of samples, partly because of the very great number of items and factors involved. Nor is the experience derived from inquiries into related fields—such as prices—of any particular help.

I am not venturing to offer any final solution to this problem. I do wish to suggest, however, that considerable addition to our limited information on the subject might be obtained through a careful breaking down of the samples made available in existing or in future surveys, and in this connection I submit the partial results of a hurried and a rather rough-and-ready sample analysis which I have made of the schedules secured in the cost-of-living survey of Federal employees made by the Bureau of Labor Statistics in 1928.

The survey referred to covered a total of 506 families about equally

distributed in five cities. The selection of families was limited to those in which the government salary of the husband was not in excess of $2,500, in which there was a wife living and in which there was at least one dependent. The range of occupations was very broad—laborers, watchmen, engineers, inspectors, guards, clerks, accountants, and technical workers of the lower grades. Also, the range of incomes was quite wide, being fairly well scattered from less than $1,200 per year to more than $3,000. The average size of the family was 4.7 persons.

At the time the survey was made, the schedules were numbered consecutively by cities as received in the Bureau. Using these numbered schedules as a basis, I have had made a separate tabulation of the data for all of the 506 schedules and for each of six groups of diminishing size, the schedules for each group being selected at random. The groups contained the following number of schedules: 506, 405, 304, 253, 202, 101, and 51. The first group, as noted, contains all the schedules available; the second group was obtained by dropping out every 5th schedule; the third group, by dropping two out of every 5 schedules, etc. Because of the amount of work involved, it was not possible to reshuffle the schedules completely for each selection.

TABLE I

AVERAGE EXPENDITURES FOR PRINCIPAL EXPENDITURE GROUPS

Item	506 Families	405 Families	304 Families	253 Families	202 Families	101 Families	51 Families
Food	$810.64	$817.92	$819.89	$796.08	$809.82	$826.50	$783.35
Clothing:							
Husband	91.30	91.31	90.80	91.48	93.22	97.64	92.66
Wife	84.13	83.32	80.19	82.45	81.27	91.49	76.80
Children	119.75	121.26	121.95	119.40	121.88	126.24	123.83
Other dependents	2.07	1.68	1.91	2.12	2.59	1.94	3.78
Total clothing	297.24	297.57	294.85	295.44	298.96	317.30	297.07
Housing:							
Rent	307.69	299.79	288.02	303.79	296.99	301.01	305.04
(Families renting)	(344)	(269)	(196)	(170)	(135)	(65)	(33)
Payment on owned home	236.96	245.80	248.22	230.65	238.48	245.55	255.67
(Families owning)	(162)	(136)	(108)	(83)	(67)	(36)	(18)
Heating and lighting	134.74	134.15	134.40	135.82	131.98	136.14	130.57
Furniture and furnishings	75.46	74.34	75.31	73.27	79.92	76.38	88.83
Miscellaneous (all other) items	730.49	722.87	724.44	723.29	715.37	769.09	775.05
Total expenditures	2,593.21	2,592.44	2,585.13	2,558.34	2,571.54	2,671.97	2,635.59
	Per cent of total expenditures						
Food	31.3	31.5	31.7	31.1	31.5	30.9	29.7
Clothing:							
Husband	3.5	3.5	3.5	3.6	3.6	3.6	3.5
Wife	3.2	3.2	3.1	3.2	3.2	3.4	2.9
Children	4.6	4.7	4.7	4.7	4.7	4.7	4.7
Other dependents	.08	.07	.07	.08	.10	.07	.14
Total clothing	11.5	11.5	11.4	11.5	11.6	11.9	11.3
Housing:							
Rent	11.9	11.6	11.1	11.9	11.5	11.3	11.6
Payment on owned home	9.1	9.5	9.6	9.0	9.3	9.2	9.7
Heating and lighting	5.2	5.2	5.2	5.3	5.1	5.1	4.9
Furniture and furnishings	2.9	2.9	2.9	2.9	3.1	2.9	3.4
Miscellaneous (all other) items	28.2	27.9	28.0	28.3	27.8	28.8	29.4
Total expenditures	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The general character of the results obtained are presented in two tables. Table I shows for each of the 7 samples the average expenditure, and the percentages such averages form of total expenditures, for the principal expenditure groups—food, clothing, etc.

A reading of the percentage figures across the table shows on the whole comparatively little variation from the 506 group to the 202 group, but a few rather sharp changes thereafter.

An analysis was also made of the principal items included under "miscellaneous expenditures." The results of this analysis are shown in percentages in Table II, which also shows for all 506 schedules the number of families having each of the indicated expenditure items and also the average expenditures for that item.

TABLE II

EXPENDITURES FOR MISCELLANEOUS ITEMS

Item	Number of families having expenditures	Average expenditures for all 506 families	Per cent average expenditure for indicated item is of total expenditures						
			506 Families	405 Families	304 Families	253 Families	202 Families	101 Families	51 Families
Health	494	$112.99	4.4	4.3	4.6	4.3	4.3	4.6	4.7
Life, accident and health insurance	475	95.78	3.7	3.6	3.5	3.8	3.7	3.5	3.8
Retirement	443	54.47	2.1	2.1	2.1	2.1	2.1	2.0	2.1
Personal property insurance	143	2.81	.11	.11	.10	.12	.09	.11	.10
Personal property and poll taxes	226	1.67	.06	.06	.06	.07	.06	.07	.09
Church and Sunday school	455	24.15	.93	.90	.92	1.01	.94	.87	.95
Labor organizations	171	1.86	.07	.07	.08	.08	.07	.07	.06
Lodges, clubs, and societies	270	8.46	.33	.32	.32	.34	.30	.32	.30
Street-car fares	497	63.16	2.4	2.4	2.4	2.5	2.4	2.3	2.4
Automobile payments	36	27.60	1.1	1.0	1.0	.84	1.1	1.3	1.7
Automobile supplies and repairs	116	27.06	1.0	.99	1.1	1.1	.97	1.1	1.1
Motor-cycle supplies and repairs	2	.08	.003	.004	.01	.002	.01	.01	...
Telephone	294	21.16	.82	.82	.83	.83	.78	.77	.75
Laundry	338	33.45	1.3	1.3	1.3	1.2	1.3	1.4	1.2
Barber and beauty shops	501	20.75	.80	.79	.80	.79	.81	.75	.77
Tobacco	380	26.71	1.0	1.0	.99	1.1	1.0	.95	.92
Papers, magazines, and books	502	22.03	.85	.85	.84	.83	.84	.80	.76
Radio	193	15.17	.59	.60	.60	.59	.61	.75	.88
Movies and other amusements	479	34.29	1.3	1.3	1.3	1.4	1.3	1.3	1.4
Vacation	153	24.00	.93	.93	.96	.95	.96	1.2	1.1
Other miscellaneous items	506	112.82	4.3	4.3	4.2	4.3	4.1	4.5	4.3
Total miscellaneous		730.49	28.2	27.9	28.0	28.3	27.8	28.8	29.4

It appears that, in most instances, there is very considerable uniformity in the percentage figures as far as the 202 group, and in some instances even in the smaller groups. The degree of uniformity does not appear to be affected as much as might be expected by the factor of frequency of occurrence of the particular items, except in the one item of motor-cycle supplies and repairs which was represented in only 2 schedules. In items with such an extremely low frequency of occurrence it is evident that even 506 schedules are not sufficient to be repre-

sentative, but their money importance is usually so small when distributed over all the schedules that it seems questionable whether it is worth while to seek representativeness by further extension of the coverage, if such extension is not otherwise justified.

Finally, and again as of purely experimental interest, a computation was made of the cost-of-living index numbers that would result from applying the group weights of the 7 samples in Table I, to the price indexes obtained by the Bureau of Labor Statistics in its semiannual surveys. The prices of June, 1929, were used, as prices were then at a high peak as compared with the base year 1913. The results are in Table III.

TABLE III

Using group weights shown in Table I, for sample indicated	Cost-of-living indexes at prices of June 1929. 1913=100
506 schedules	172.4
405 "	172.2
304 "	172.4
253 "	172.5
202 "	172.5
101 "	172.7
51 "	173.2

This table shows that, using June, 1929, prices, indexes of cost of living, down to the 101 sample group, ranged only between 172.0 and 172.7, a difference of less than one-half of 1 per cent.

In conclusion, the figures above submitted are not to be regarded as of any very great significance in themselves, but are intended to be merely suggestive of what might be done along this line, using a larger base sample and making the analyses much more elaborately and carefully than I have been able to do. Moreover, I have here dealt with budget studies simply as their results might be used for weighting purposes in constructing cost-of-living indexes. The use of budget studies for the purpose of ascertaining the actual standards of living of the population involves greater difficulties but no essentially different principles as regards the adequacy of the sample.

STATE AND FEDERAL COÖPERATION IN THE COLLECTION OF INDUSTRIAL STATISTICS

By Roswell F. Phelps

The Committee on Government Statistics and Information Services (sponsored by the American Statistical Association and the Social Science Research Council) was organized primarily for the purpose of securing better coördination of statistics collected by Government bureaus in the various fields in which they operate. Dr. Stuart Rice, President of the American Statistical Association and Chairman of this Committee has stated that

> One of the problems we are encountering in seeking here in Washington to set up a single coördinated schedule (in parts) on which to secure data now obtained through separate agencies such as the Census of Manufactures, the Census of Distribution, and the Bureau of Labor Statistics—all for the purposes of the Industrial Recovery Administration—has been the relation between Federal Agencies and the various state bureaus collecting statistics of similar types.

It is particularly opportune at this time when the Federal Government, on its own initiative, is endeavoring to coördinate its statistical output and to eliminate duplication of inquiries by its numerous bureaus that serious consideration be given to the development of a more comprehensive plan of coöperation between the Federal and state bureaus in the collection of statistical data. Notable precedents of this nature have already been established and, while precedent is not always a sufficient justification of the continuance of an established practice, the results of coöperative action by Federal and state bureaus in the statistical field, in most instances, have been so satisfactory, that, in the public interest, an extension of such coöperation should be earnestly undertaken.

At the annual meeting of the American Statistical Association in 1921 it was proposed that there be appointed a committee consisting of statisticians representing various Federal, state and other agencies engaged in the collection of labor statistics. The Association adopted the proposal and the Board appointed a "Committee on Governmental Labor Statistics." The first problem to which the committee devoted its attention was the development of a standard plan to be followed by governmental agencies in the collection and publication of employment and payroll statistics. The results of its efforts in this field were published in 1926 in a report entitled "Employment Statistics for the United States." The "Standard Plan" recommended by the committee

has been adopted by the Federal Bureau of Labor Statistics, by the labor departments in nearly all of the leading industrial states and by several other agencies which are engaged in the collection of employment and payroll data. It was the purpose of the committee to secure not only a more extensive representation of the industrial states in this branch of statistical work but also to secure greater uniformity in the procedure to be followed in the collection and publication of the statistics in order that the data collected by the Federal and state bureaus might be strictly comparable. The U. S. Bureau of Labor Statistics which has entered into coöperative arrangements with a large number of the states in the collection of employment and payroll data during the past few years has become a highly effective coördinating agency in the development of the standard plan of reporting recommended by the committee in the report to which reference has been made. While still endeavoring to secure the adoption of the plan in as many states as possible and to improve it in accordance with changing industrial requirements, the committee has enlarged the scope of its activities by devoting attention to other branches of statistical research in order to secure uniformity of reporting and coöperative action by the Federal and state bureaus. Through member representation on the Committee on Government Statistics and Information Services and on the Advisory Committee to the Secretary of Labor it has become officially recognized and consequently more effective in its capacity as an advisory body.

In answer to my request for information relative to existing coöperation between the U. S. Bureau of Labor Statistics and the several states in the collection of Labor Statistics Dr. Charles E. Baldwin, Assistant Commissioner of Labor Statistics in the Federal Bureau has recently sent me a statement from which I quote as follows:

> *Employment and Payroll Statistics.* The Bureau of Labor Statistics of the United States Department of Labor in coöperation with 13 agencies in 12 states collects and publishes each month data concerning changes in employment and payrolls in 17 important industrial groups of the country. The cooperating offices are in the following States: California, Illinois, Kansas, Maryland, Massachusetts, Michigan, New Jersey, New York, Pennsylvania (2), Texas, and Wisconsin.
>
> You will note that these coöperating agencies in most instances are located in the most important industrial states of the Union and, therefore, it is not surprising that nearly 50 per cent of the total reports secured by the Federal Bureau for the entire country are supplied through these 13 coöperating offices.
>
> Three of these coöperating states (New York, New Jersey, and Massachusetts) were collecting data concerning employment and payrolls in manufacturing establishments prior to the entrance of the Federal Bureau into the field in 1915. Other state bureaus interested in employment trends in their

respective states entered the field at various later dates. As the demand for more comprehensive information on changes in employment became apparent in recent years, the monthly employment surveys have been expanded to cover additional branches of industry and at the present time nearly all coöperating offices are collecting information concerning trade, utilities, construction, and other important groups in addition to manufacturing industries.

Building Statistics. At the present time the states of Illinois, Massachusetts, New Jersey, New York, North Carolina, and Pennsylvania are coöperating with the Bureau of Labor Statistics in the collection of building permit information.

These states through their departments of labor send out each month blanks asking for the number and estimated cost of buildings for which permits are issued in all cities in their states having a population of 10,000 or over.

The coöperation of these states with the Bureau's work prevents duplication, as otherwise the Bureau would have to send reports directly to 333 cities from which reports are already collected by the states.

There are numerous fields in which Federal and state bureaus are interested in the same data, but the question of division of labor and the extent of coöperation which may be feasible in the collection of such data would vary in the several fields. In some cases the difficulties involved might appear, at the outset, to outweigh the advantages. A complete list of the coöperative plans which have already been adopted would be imposing but the possibilities of extension of such plans into other fields of research by government agencies (Federal, state, county, and municipal) and by institutions have, by no means, been exhausted.

The Federal Census Bureau is already coöperating with a large number of states, municipalities and institutions in the collection and compilation of statistics of various kinds. Mr. Tracy E. Thompson, in response to my request has prepared a brief outline of the nature of such coöperative arrangements now in effect from which the following is quoted.

In the collection of the institutional statistics in the Division of Population prison clerks compile figures for the reports on "State and Federal Prisons and Reformatories"; somewhat similar procedure is followed in the canvass of institutions for mental diseases, mental defectives and epileptics and also of those for county and city penal institutions, juvenile delinquents, and charitable institutions.

For the census of statistics of states and cities the figures in the less difficult cities are compiled by employees connected with the local city government, while those for the more important municipalities are collected by a central field staff.

Vital statistics are compiled from transcripts of births and deaths furnished by state health departments, some one in each department acting as Census Special Agent. Public Service Commissions also coöperate with the Bureau in the Census of Electrical Industries.

In the collection of statistics of manufactures, Massachusetts is the only state with which the Federal Census Bureau has coöperated. As Director of Statistics in the Massachusetts Department of Labor and Industries I have, on several occasions been appointed by the Federal Census Bureau as Supervisor of the Census of Manufactures in that State, and I shall discuss briefly the plan of coöperation which has been adopted in taking such census.

In accordance with statutory requirements a census of manufactures in Massachusetts has been taken each year beginning with the year 1886 and there is now available in that state a continuous series of annual statistics of manufactures for the entire period 1886 to 1932. As early as 1905 the census in Massachusetts was taken jointly by the Federal Census Bureau and the state bureau and on every occasion thereafter when the Federal Bureau has taken a nation-wide census of manufactures the Federal and state bureaus have coöperated in this work, namely in 1905, 1910, 1915, 1919, and every second year thereafter, and arrangements have been made for coöperation in taking the census for the year 1933, which is now under way.

The joint collection of the statistics of manufactures in Massachusetts by the Federal and state bureaus has proved to be mutually satisfactory. The principal advantages resulting from such coöperation may be summarized as follows:

1. Duplication of field work by the two bureaus is eliminated. The field work is done by the state bureau and the Federal questionnaires are used jointly, the original copies of which are forwarded to Washington after duplicate copies have been made for the use of the state bureau in the tabulation of the returns by localities and industries thereunder.

2. Employers are required to file only one report instead of two reports which would be very similar in character. The Massachusetts statute provides that in those years when the Federal Census Bureau takes a census of manufactures the state bureau may modify the contents of its questionnaire so as to provide for full coöperation with the Federal Bureau.

3. Some saving in expense is effected, particularly in the case of the state bureau. The Federal Bureau assists financially by assigning a definite number of field agents and clerks who are employed under the immediate supervision of the Director of Statistics in Massachusetts, who is appointed Supervisor of the Census in that state. The state bureau is granted the franking privilege in connection with this work. According to the records the per schedule cost of the field work in Massachusetts is usually about the same as the corresponding per schedule

cost in other states where the field work is done directly by the Federal Bureau. In 1927, however, the average cost per schedule for the entire country was $1.30 as compared with the average cost per schedule of $1.00 for the schedules returned from Massachusetts. In 1931 the corresponding averages were $1.01 for the United States and $1.07 for Massachusetts.

4. An exact comparability of results is assured. If a census of manufactures were taken independently by the two bureaus an exact agreement in results would hardly be possible in an undertaking of so large a magnitude, because of some differences (however slight) in methods of procedure, in industrial classifications and in definition of terms. Through coöperation in the collection of the returns and the use of a single questionnaire an exact agreement as to results is secured.

5. Delinquent reporting establishments are more readily canvassed. Although the Federal Bureau may lose direct contact with the reporting establishments, yet the state bureau because of its proximity to the reporting establishments can more readily secure reports from delinquent employers than can the Federal Bureau working at long range.

6. The data by localities are made available for publication more promptly and in greater detail when tabulated by the coöperating state. From the standpoint of the state this is the principal advantage resulting from coöperation in the collection of the returns. If the coöperative agreement were to provide (as in the agreement with Massachusetts) that the state could retain copies of the original questionnaires sent to Washington, and independently tabulate the returns by municipalities and industries thereunder, the state would then be able to tabulate the returns in much greater detail than the Federal Bureau and publish the returns much earlier because first consideration by the Federal Bureau is quite properly given to the tabulation and publication of the data by industries for the country at large.

These considerations are brought to the attention of this Association in the hope that through its instrumentality coöperation in the taking of the Census of Manufactures by the Federal Bureau of the Census and those states which have efficient statistical bureaus may become effective in the very near future.

USING STATE BUREAUS FOR THE JOINT COLLECTION OF LABOR STATISTICS

By Howard B. Myers

Under the system of divided governmental authority which exists in this country, the joint collection of labor statistics by the states and the Federal government is the logical outgrowth of a common interest. As responsibility for the initiation and administration of labor legislation rests, in the main, with the states, it is obvious that the collection of statistics pertaining to the field of such legislation is a matter of vital interest to the states. In recognition of this fact most states have made some provision for the collection of labor statistics. Nearly a dozen of the larger industrial states support efficient statistical bureaus of rather considerable size; in some cases these bureaus have been in existence for more than half a century.

The Federal government also has a direct interest in this field. A very definite need exists for coördinated labor statistics which cover the country as a whole or large industrial and geographic areas which transcend state lines; and this need seems capable of fulfillment only through the Federal government. In furtherance of the common welfare, Federal activity may well extend to include the collection of labor data for fields or areas not adequately covered by state statistical bureaus. The Federal interest receives practical application through the Bureau of Labor Statistics, the Women's Bureau, the Children's Bureau, and the Employment Service, within the United States Department of Labor, and through a number of other statistical organizations in other branches of the Federal government.

As recognition of the joint statistical interest of the states and the Federal government in the labor field has spread, a somewhat haphazard system of state-Federal coöperation in collection has developed. The most important application of the joint collection principle has been that of employment, payroll, and man-hour statistics. More than a dozen states, within which are carried on more than three-fifths of the manufacturing activities of the country, transmit monthly employment data to Washington for inclusion in the Federal reports. Employment office statistics, statistics concerning child labor, industrial accident statistics, and a number of other types of labor data have also been collected through joint coöperative action by state and Federal statistical bureaus.

During recent years the joint collection principle has fallen into disfavor in some quarters. Some of the data collected through coöperative

action have been of indifferent quality, and a considerable amount of waste and duplication of effort has been involved in the operation of the system. Development of the coöperative principle is a relatively slow process, particularly at the present time, since most state statistical bureaus have been severely crippled through reductions in appropriations. The rapid growth of legislation pertaining to labor, the increasing demands of governmental, industrial, and labor organizations for accurate, unified labor data on a comprehensive scale as a guide in determining administrative policy, the expansion of Federal statistical activity through the Bureau of Labor Statistics and through new Federal agencies such as the National Recovery Administration, and the rise of the trade association as an agency for the collection of labor statistics, have created a tendency toward rapid centralization in the statistical field, with consequent diminution of the importance of the principle of joint collection.

There is a good deal of truth in the charge that the state-Federal coöperative system, in its present form, is wasteful and inefficient. The procedure used in the collection of employment, payroll, and man-hour data may be taken as an example, as it is in this field that the most important development of the joint collection principle has come. The United States Bureau of Labor Statistics agrees to accept, for inclusion in the Federal reports, employment data collected by qualified state bureaus of labor statistics, authorizes the use of the Federal frank for the collection of such data by accepted bureaus, and discontinues the direct collection of employment statistics in the states which are included in the coöperative arrangement. The coöperating states continue to collect data, and to classify and tabulate them for local use, in accordance with procedures which they have previously established, without effective coördination or control by the Federal Bureau.

This arrangement has a number of unfortunate results. In the first place, as the system of classifying reporting firms is not standardized, each coöperating state tabulates the questionnaire reports which it receives in accordance with its own system, and then forwards the original questionnaires to Washington, where the data are completely repunched and the entire tabulation process repeated. Second, the standard of work performed by the coöperating states varies, within rather wide limits, with the competence of personnel and the financial resources of the coöperating state bureaus. Third, the size and composition of the reporting sample in coöperating states also vary, within wide limits, in accordance with the interests of the state bureaus and the resources at their disposal, with consequent impairment of the Federal sample. These deficiencies do not appear to be inherent in the system, however.

They indicate the need for a fuller application of the joint collection principle, rather than its abandonment.

The contention that urgently needed statistical data can be collected more speedily under a centralized system than by means of the coöperative procedure used in the past is of doubtful validity. It seems probable, on the contrary, that a standardized and adequately supervised state-Federal coöperative system, involving sufficient grants of funds to enable the coöperating states to carry out the required expansion, and utilizing local contacts already established by the states, is the most expeditious method of securing additional data.

As an example, take the need for the rapid expansion of employment statistics. The coöperating states now gathering this type of data represent more than three-fifths of the manufacturing activity of the country. It would appear that the more urgent the demand for prompt and adequate information concerning employment and payroll volume, the greater the need of building on the extensive foundation already laid, of capitalizing the experience and familiarity with local conditions that attach to the state bureaus, and of utilizing the direct local contacts and goodwill which state bureaus have already developed. The importance of operating through existing state agencies becomes even more clear if accident statistics be taken as an example, since the Federal government has done relatively little in this field.

The current discussion of the problems of collection of labor data has been concerned primarily with employment, employment office, and cost-of-living data. The Federal government has done relatively little work in fields such as accident and factory inspection statistics, which are of the highest importance to the states. In these fields particularly it would appear to be the part of wisdom to work coöperatively toward the development of statistical data on a unified, national scale.

The importance of building up a unified, national statistical program should not be permitted to overshadow the importance of developing adequate statistical data to meet purely local needs. The administration of labor legislation is essentially a state problem, and the availability of original data for special local tabulations designed to throw light on administrative problems is a matter of major importance to state employment offices, factory inspection divisions, workmen's compensation commissions, and other administrative bodies. The Federal government could scarcely be expected to tabulate employment data for any but the largest cities, yet such data may be almost equally important, from the point of view of the states, for relatively small communities. For example, in the State of Illinois, the three adjacent cities of La Salle, Peru, and Oglesby each have fewer than 15,000 inhabitants,

yet these three towns constitute the center of the important silica, cement, and clock industries of the state. State bureaus compiling employment data find that a considerable share of the demand for their figures relates to such smaller communities.

Many types of labor data are collected on a purely voluntary basis; employers are not compelled to provide such data if they do not desire to do so. Even where legislation requires the submission of reports, it has usually been found more satisfactory to operate in fact on a voluntary basis. The educational values secured through collection by local agencies, familiar with local problems and needs, and able to supply and interpret statistical data upon request, are of considerable importance. An efficient, coöperative state or local statistical bureau can do much in building up local interest in and appreciation for labor statistics. These valuable local contacts could not well be built up or maintained by a Federal statistical bureau, relying on the mail or the telegram.

One of the main arguments for the development, more than a decade ago, of the state-Federal coöperative system in the collection of labor data, was the need for eliminating multiple requests for substantially the same data by independent and non-coöperating statistical agencies. The average employer is quick to resent what he regards as useless annoyance; a fact which has been rediscovered in recent months as a result of the veritable flood of uncoördinated questionnaires mailed out by newly-developed statistical agencies. It is hardly to be expected that state bureaus of labor statistics will willingly abandon statistical fields in which they have been pioneers. Failure to extend the joint collection principle is likely to result in the permanent alienation of many employers, with consequent damage to both state and Federal statistical work.

The opportunities for experimentation which exist in a system of joint collection should not be lightly disregarded. In this connection it is interesting to note that experiments looking toward the improvement of labor data have, in most fields, been largely of state origin. As examples in the field of employment statistics, the use of the "fixed list" rather than the "link-chain" method in New York, the adjustment of trend for conformity to the Census in Pennsylvania through the instrumentality of the Third Federal Reserve Bank, and the separation of data by sex in Illinois may be cited.

The fact that the supplementary funds now available to Federal statistical agencies are, in the main, emergency in nature, constitutes a serious objection to any marked shift toward centralized collection of labor statistics. With the passage of the present emergency it is probable that the amount of funds available for statistical work may be reduced. While decreases in available funds will, under any arrangement, tend to

reduce the volume of statistical data collected, the effects of such decreases will become more serious as the centralization of collection procedure is increased.

I feel strongly that the most desirable approach toward the expansion and improvement of labor statistics in this country lies through the encouragement and extension of a system of state-Federal coöperation. A rounded state-Federal statistical program in the labor field should include coöperative collection of comprehensive statistics concerning employment, payrolls, man-hours worked, earnings, wage rates, labor turnover, industrial accidents, industrial disputes, child labor, employment office and factory inspection activities, data required to administer minimum wage laws, cost-of-living data, and a wide range of data relating to working conditions in various industries and localities. Building permit data, which are already being collected by state and Federal labor bureaus, might also be included in such a program.

The form which the coöperative system should take would probably vary somewhat with the type of statistical data under consideration and the relative advancement of Federal and state labor bureaus in the field. One would expect the system evolved for industrial accident statistics, for example, to differ in the relative emphasis placed on state and on Federal activity from the system developed for employment and payroll data.

As a general approach toward a state-Federal coöperative plan, however, it is suggested that a continuing advisory committee be created, endowed with broad advisory powers, and composed of representatives of Federal and state bureaus of labor statistics, together with representatives of other governmental and private research organizations particularly interested in labor statistics. Standards relating to the selection and size of samples, report forms, classification, editing, coding, punching, and tabulating should be established by the Federal Bureau of Labor Statistics, in consultation with the state bureaus and the advisory committee. State bureaus meeting these standards should be approved as coöperating states upon signifying their desire to enter the coöperative system.

Coöperating states should assume responsibility and control over the issuance and collection of schedules, should edit, code, punch, and tabulate returns, and should submit the resulting data, in standardized form, to the Federal Bureau of Labor Statistics, avoiding the present wasteful duplication of tabulation.

The coöperative system should not be permitted to hinder either the Federal or the state bureaus in making independent studies, and the states should be granted as much freedom as is consistent with compara-

bility in making additions to or alterations in schedules issued under coöperative agreement.

States accepted into the coöperating system should receive the Federal franking privilege and should be provided with clerical assistance and moderate grants-in-aid on submission of satisfactory proof that such aid is necessitated by the expansion of work caused by the coöperative project for which the grant is to be used. It may be remarked in passing that such a system of grants should involve a considerably smaller expenditure than would the collection of data direct by the Federal government.

The standards set for the coöperative enterprise should be enforced by means of annual and unannounced inspections and by the withdrawal of the franking privilege, clerical assistance, and grants-in-aid from substandard states.

The Federal Bureau of Labor Statistics should collect and tabulate schedules directly in states not able to assume the coöperative load in whole or in part. This is in accordance with existing procedure. Such non-coöperating states, upon expressing a desire to enter the coöperative system, should be advised and assisted to this end by the Federal Bureau of Labor Statistics and by the advisory committee.

STATISTICAL PROBLEMS OF THE MEAT PACKING INDUSTRY UNDER AN AGRICULTURAL ADJUSTMENT ADMINISTRATION TRADE AGREEMENT

By Charles F. Sarle

The meat packing industry slaughters and processes the supply of hogs, cattle, calves, sheep, and lambs produced and sold by farmers and also distributes the meat products therefrom, in most cases directly to retailers. The industry has long prided itself in having maintained an outlet for the farmer's livestock whenever the farmer has wanted to sell. The farmer and not the industry determines the volume of livestock processed. Generally speaking, meat is perishable. It must be moved on to the consumer *at whatever price the consumer is willing to pay.* The cured products of the hog, ham, bacon, etc., require time for curing, specialties and canned goods requiring more complicated methods of processing.

Refrigeration is essential from the time the animal is slaughtered, while the meat is in transit, in the branch houses in consuming centers, even down to the retailer who sells us pork chops, steaks and roasts. Beef, veal, mutton and lamb, and fresh pork cuts move rapidly through this refrigerating system of distribution. Only in times of excessive hog runs is it necessary to freeze pork loins for use at some future time.

The meat packing industry performs two highly important functions leveling out supply in that it (1) accepts all livestock offered by farmers for slaughter and distributes the product therefrom to consumers in all parts of this country and in the case of hog products to foreign consumers as well, and (2) it also allocates in time the rate of selling the product. The limit of time within which fresh cuts of meat must be distributed is short, not much over two weeks; but with the cured hog products or frozen loins the time limit can be extended to a number of months, usually not to exceed six. In the case of hogs, the heaviest marketings of the year come in mid-winter, whereas a seasonal period of scarcity develops in mid-summer and early fall. Storage operations with the cured products and frozen loins may be an important source of loss in a period of falling hog prices and of profit when the course of prices is generally upward. Unlike cotton or wheat there is no well organized and broad futures market that can be used to carry the time risk involved in the processing and distribution of meat products. All in all, the meat packing industry is not only one of the largest in this country with an annual turnover running into billions of dollars, but is also one of the most indispensable from a social point of view.

The meat packing industry is highly competitive. Facilities exist in excess of requirements. The packing plant has moved westward in an effort to keep up with the westward march of livestock production. Small independent packing establishments west of the Mississippi River have grown rapidly in size during the last two decades until today they are big establishments, some with direct foreign outlets. These family-managed, low-cost plants close to the source of hog supplies have forced the big Chicago packers to open up branch plants in these states west of the river and to buy direct from the farmer in order to obtain the volume of livestock so essential if plant and distribution costs are to be kept down and any profits at all to be made.

It is this incessant need for volume that compels these packers to bid actively against each other for the farmer's livestock. In the more important hog-producing areas, the packer who gets a particular lot of hogs from the farmer is the one of several buyers who pays the highest price. The market news service over the radio keeps the hog producer continually well informed as to prevailing market values.

In the selling of the meat products it is the packer who can sell for the lowest price and/or furnish the best service to the retailer who is able to move his product; here again competition is keen and the packer who is unable to meet prices offered by competitors finds himself with his "cooler" full of a perishable product that must be moved and usually at some concession in price.

It is natural that the leaders of such an industry should feel that the privilege of maintaining a uniform price structure in the sale of their products, dictated, of course, by the current volume to be consumed, along with an allocation of livestock supplies to individual plants on the basis of previous records of slaughter, would be beneficial to the individual concerns that make up the industry.

They are no doubt sincere in believing that the two above named privileges, or exemption from the anti-trust laws, would enable them to sell a given volume of meat products to the retail distributor at a price higher than would be possible under competitive conditions where "chiseling" and "loss leaders" are permitted. Perhaps they are right.

Furthermore, there are economies that could be effected in buying, in processing, and especially in distribution, were the anti-trust laws abrogated under a Trade Agreement and the meat packing industry permitted to operate as a *unit*. Livestock could be slaughtered near where they are produced thereby reducing "tissue shrink" that increases with the distance the live animal is shipped prior to slaughter. Plants less advantageously located, so far as proximity to livestock supplies, labor costs or taxes are concerned, could be diverted to other uses or left idle.

High distribution costs, such as the duplication of branch houses in a single trade area, and excessive service costs could be eliminated.

Should the meat packing industry obtain a trade agreement, such as it has been asking for, much new statistical data would be needed and a specialized technique would have to be developed. Under such an agreement, the comparatively free interplay of competitive forces would not determine (1) the price at which the current supply of livestock products would be consumed; (2) the distribution of volume as between various trade areas; (3) the volume of cured products and frozen cuts that would be placed in storage; (4) the price the farmer would receive for his livestock; (5) the spread or margin the packer would receive for his services; nor (6) the elimination of the least efficient units of the industry over a period of time.

The statistical problem involved would be three-fold:

(1) The determination from week to week of a wholesale price (uniform to all retailers in a given area) for livestock products that would move the current supply of such products into consumption; this involves also the problem of distribution of supply to the various consuming areas of this country and for export, as well as the movement in and out of storage.

(2) The determination of the price producers would receive on the basis of uniform prices to consumers. This involves a measurement and control of the spread or margin exacted by the industry, both currently and historically for the last 10 or 12 years.

(3) The determination of comparative efficiency of the several units within the industry and the development of means for increasing such efficiency and insuring progress in the future.

In order to handle the problem of price determination, it would be necessary to collect and keep up to date current statistics for many different kinds of meat products by trade areas within the United States as follows: (1) The flow of the supply of various meat products into these areas and to foreign countries; (2) the amount of supplies on hand (weekly); (3) wholesale prices, prevailing grade and quality, premiums, and discounts of all these products; (4) retail prices.

It would be necessary to set up the machinery for collecting, tabulating, and summarizing these data and allow time in which to get the set-up working smoothly and promptly before shifting the industry from a competitive to a non-competitive basis of operation. The program could start by continuing the prevailing price for a given product in a particular trade area until some change in price became necessary. If stocks on hand at the end of a week showed a significant decrease in a particular trade area either (1) the volume being sent to that trade

area could be increased, perhaps diverted from some other area where stocks had shown a tendency to accumulate, or (2) if stocks declined in several areas simultaneously the price could be advanced in such areas.

Furthermore, it would be necessary to anticipate future supplies from one or two weeks to several months in advance. Future consumer purchasing power would also need to be anticipated in so far as possible. Both would be useful in supplementing the *barometer* of changes in "stocks on hand" in determining the level of wholesale prices for the various products that would prevent an unwarranted accumulation of stocks, or in determining at any time the quantities that should be placed in storage for consumption later. Forecasts of foreign demand as a basis for exports would be essential also.

A unified packing industry operating under constructive leadership could be coördinated with livestock producers, in regulating the flow of livestock supplies to market. Producers could report periodically the prospective volume of livestock and the probable time such livestock would be "finished" and ready for market. The central office of such a producer organization could level out threatened peaks of livestock marketings.

A producer organization with county local units in all commercial producing areas representing a very large proportion of the producers of hogs, cattle, calves, sheep, and lambs could not only exercise some much needed control over the seasonal distribution of market receipts of livestock, but would be indispensable in planning and carrying through this nation-wide program for production control of livestock. Furthermore, such an organization would give farmers real representation in dealing with a unified meat packing industry in determining the proper margin for slaughtering, processing, and distributing livestock products.

Once a fair "margin" for the service of processing and distribution has been agreed upon by a committee representing the packers, the producers and the consumers, with the Administering Department of the Government acting as fact finder, arbitrator, and, for a while at least, exercising veto power, the problem of determining the price to producers becomes one of simple subtraction—the subtraction of this margin from the prevailing wholesale price as determined above. Geographic and transportation price differentials would need to be worked out, as well as price differentials for grade and quality of livestock.

The problem of measuring this spread for the industry is highly complex. The number of products covered could be materially reduced by excluding the so-called specialties and super-delicacies that have been developed under widely advertised brands and which represent a com-

paratively small part of the total volume. Likewise, many of the subsidiary and by-product activities of the packers could be excluded.

The difficulties of attempting to evaluate capital investment, good will, etc., could be avoided by taking either (1) the average margin for the industry that did exist in some previous period of several years when the industry was expanding such as 1920 to 1929 as "normal" and, after making necessary allowances for changes of various kinds that have occurred since then, "freeze" temporarily the current margin at that amount, or (2) determine statistically the significant factors that apparently have been responsible for the margin during the 10-year post-war-pre-depression period and from this study calculate a "normal" margin under current conditions that could be used as a starting point in calculating price to pork producers.

It is interesting to note that preliminary statistics in this field seem to indicate that packers' margins on hogs tend to be inversely correlated with the size of the previous margin; that is, a profitable storage season, when decreasing market supplies of hogs and advancing prices have resulted in better-than-average margins (due to the time involved between slaughter and sale of cured and stored products) is usually followed by a season of smaller-than-average margins.

The fundamental objective in permitting the anti-trust laws to be abrogated, so far as the meat packing industry is concerned, is to make it possible for a unified and largely self-managed industry to effect economies in operation—assembling livestock, slaughtering, processing, storing, and distributing. Statistical studies covering expenses of distribution have already been made by members of the research staffs within the industry. Results of such studies indicate that a fertile field exists for the use of multiple correlation in determining where economies could be effected, and non-essentials eliminated. As economies are actually effected and savings made the benefit should accrue in part to the packing industry as an incentive for greater effort along this line and in part to the producer in an effort to obtain for the producer a price equal to the "fair exchange value," the goal of all Agricultural Adjustment Administration activities.

This gross composite margin between the price paid by the packer for livestock at the packing plant and the wholesale price received by the packer when he sells to the retailer will need to be broken down into its several parts for study and analysis. There is the margin (1) between the slaughter price and the value of green cuts, (2) between fresh pork (green cuts) and lard and wholesale prices for the same, (3) green cuts of products that will be cured and the wholesale prices for these products after they are pickled, smoked, etc. and prepared for sale, and (4) spread

between cured products, hams for example and cooked or canned products. Margins between domestic and foreign markets should be studied carefully. There is also the matter of analyzing storage costs.

Furthermore, there is the retail margin that must be watched if the trade agreement is to have a chance to operate successfully.

One of the alleged advantages of competition is the stimulus to increased plant efficiency, technological improvements and progress generally. The plants that can best adapt themselves to new conditions, reduce costs of operation and increase profits are able to expand and assume a more important place in the industry. "Freezing" of the industry at its present level of efficiency certainly is not desirable, nor does it appear necessary even under a trade agreement.

Index numbers could be developed that would measure the efficiency of individual packing plants in the processing of the several kinds of livestock. Such index numbers could be used as a basis for re-allocating from year to year livestock quotas as between the various plants or concerns within the industry. Three index numbers are suggested for this purpose. They would show the tonnage or number of livestock processed (a) per man hour employed, (b) per energy unit consumed (fuel, electricity, etc.) and (c) per composite unit of supplies (other than livestock) utilized. Some correction might be desirable in the first index to allow for time lost by regularly employed workmen.

Reallocation to individual plants or concerns of the supply of livestock processed could be made from year to year using these index numbers (1) on an absolute basis, and (2) on the basis of the change in efficiency from one year to the next. In this way the incentive to make improvements, to become increasingly efficient would be provided and with the profit motive as the driving force.

The control over the processors' margin would be exercised for various segments of the industry. The units within these homogeneous segments would perform a similar function. These units would be encouraged to compete with one another in efficiency of operation and organization, and would be rewarded in proportion to level of efficiency attained and improvement made. Over a period of years the less efficient and progressive units would be eliminated gradually.

STATISTICAL PROBLEMS ARISING OUT OF THE NRA CODES: THE AUTOMOBILE INDUSTRY

By Lawrence H. Seltzer

By themselves, the statistical problems raised by the codes submitted under the National Industrial Recovery Act are not new. All statisticians have long had to contend with the varying, inconsistent, and overlapping classifications in the available statistical data in economics; and with the absolute lack of quantitative information on many vital subjects. These well-known deficiencies have been a natural consequence of the fact that all of us have had to employ for our special purposes the data assembled for dissimilar objectives by a great variety of distinct agencies. And those of us who have been in a position to design and initiate new compilations for our special purposes have experienced the enormous discrepancies between the demands of statistical uniformity and convenience and the patent diversities of the facts of business.

But these familiar problems, long serious enough for purposes of description and analysis, have now been charged with a new importance by the necessity, under the National Recovery Administration, of assembling and employing quantitative data for a significant measure of centralized governmental control over all industry. Because it is their economic implications rather than their technical characteristics that give these problems their present new significance, I shall confine this discussion to the former, particularly as illustrated by the codes of several divisions of the automobile industry.

The automobile industry as a whole comprises more than a score of overlapping and partially independent divisions, most of which have submitted separate codes to the National Recovery Administration. Obviously, the first problem that arises is that of industrial classification. Motor vehicles are the assembled products of numerous distinct components, some of which are produced by the motor vehicle manufacturers proper, some by separately incorporated subsidiaries of such manufacturers, a great many by specialized parts-makers, and some by relatively unspecialized producers of wood and metal sub-products. A number of the signatories of the automobile manufacturing industry's code are also engaged in repair work, in transportation, and in other activities falling within the jurisdiction of other codes, despite the fact that the same plants and personnel are often employed in these varied activities. The problem of overlapping industrial classifications arises in greater degree in the case of the parts-makers, many of whom produce

a variety of finished products and components unrelated to motor vehicles. The same stamping machine that stamps out hub caps and similar automobile parts is used to stamp out steel beer drums, parts of electric refrigerators, farm tools, etc. And there are many wood- and metal-working plants servicing other industries mainly that include one or a few automobile components among their products. Hence, numerous enterprises must operate under a number of distinct codes. And when, as is frequently the case, the same plants and personnel are employed for diverse products, simultaneous observance of the varying provisions of the several codes involves statistical, accounting, and managerial difficulties that need only be suggested to be appreciated.

More important, however, are the economic repercussions of our difficulties in classification. To the extent that substantial differences in wages, hours, and other provisions are incorporated in the separate codes of overlapping and competitive industrial classifications, new artificial competitive factors are introduced. An automobile manufacturer who makes his own parts in the city of Detroit must pay minimum wages of 43 cents an hour and may not employ his ordinary factory workers for more than an average of 35 hours a week. An automobile parts enterprise that produces the identical parts in the same city may pay minimum wages of 40 cents an hour and may employ its factory workers for an average of 40 hours a week. If, in actual experience, the more lenient restrictions upon the parts-makers give them a real advantage in the production of components, it would be reasonable to expect more and more of the manufacture of components to be farmed out to the parts-makers to enable the automobile producers to obtain the advantages of the lower costs permitted by the parts-code—but thereby rendering the wages and hours provisions of the automobile manufacturing code ineffective to that extent. It is well known that approximately 90 per cent of the labor employed in automobile manufacture is used for the production of components, and only 10 per cent for final assembly of the vehicles.

On the other hand, the code of the parts-making industry forbids its members to sell their products for less than cost of production. *Whose* cost of production, and under what conditions, and including what elements of cost, are questions that the Code Authority has yet to determine. It is easy to see that the parts-makers may experience difficulties in this connection. Their objective is clearly to raise, or at least to obtain, *remunerative* prices. But they compete not only among themselves but also with the automobile producers proper, who have been quick in the past to alter the range and scale of their own parts-producing operations in accordance with the weight of competitive con-

siderations. If the selling prices of the parts-makers are required by the code to include inflated capital costs inherited from a more prosperous past, we may reasonably expect the automobile producers to take over more and more of parts manufacture.

Somewhat similar considerations may be mentioned in connection with other divisions of the automobile industry. For example, the business of servicing and repairing motor vehicles is divided among the automobile dealers, who have one code; ordinary repair garages that operate under the automotive maintenance code, which establishes different standards of wages and hours; the motor vehicle storage garages, which also have a code of their own; and gasoline and oil stations that operate under still another code.

The problems raised by the minimum wage provisions of the various codes involve not only the difficulties of industrial classification but many others as well. Regional, competitive, and traditional influences have operated in the past to create different wages for the same types of labor in similar as well as in dissimilar industries. To the extent that the codes operate to produce new uniformities or to diminish old ones, they will necessitate an infinite series of industrial and regional readjustments. From all the numerous problems involved in the establishment and enforcement of minimum wage rates, I shall choose just one for discussion here.

The common method of establishing minimum wages for factory workers under the various codes is that of setting up minimum *hourly* rates of pay. It is obvious, however, that the average weekly, monthly, and annual earnings of a factory worker depend as much upon the volume and regularity of his employment as they do upon his hourly wage rate. A very high hourly rate, if coupled with only intermittent employment, may well result in average earnings well below any acceptable standard. And different industries offer greatly varying degrees of regularity of employment to the same types of labor. An adequate allowance for this factor in the determination of minimum wage rates would not only serve the interests of equity but would also provide an incentive to industry to reduce the instability of employment.

In the case of the codes of the automobile manufacturing and motor vehicle parts and accessories industries, considerable evidence was presented to show that the great irregularity of employment in these industries made necessary substantially higher hourly rates than those paid in stabler industries. It was shown, for example, that 62 per cent of the average number of employees in these industries were replaced during 1930; 63 per cent during 1931; and 61.5 per cent during 1932; that the annual net labor turnover rates of the automobile industry ex-

ceeded those for manufacturing industries as a whole by 69 per cent in 1930, 86 per cent in 1931, and 52 per cent in 1932; that the average working hours per working employee varied from 20.7 hours per week to 41 hours per week, a range of 99 per cent, during the 18 months ended in June, 1933; etc.

The demand for higher minimum wage rates, in view of these and other measures of the instability of employment in the industry, was met by a pledge on the part of the National Automobile Chamber of Commerce to make a special study of the means of stabilizing employment and to submit a report thereon to the Administrator. This study is still in process; and I am glad to be able to say that the measures being considered by the Chamber promise to make a substantial contribution toward reducing the present great irregularity of employment in the industry.

Our available measures of the stability of employment are very scanty. In order to determine the adequacy of any proposed wage rates in view of this factor, and, in the case of the automobile industry, in order to measure the success of the industry's efforts toward stabilization of employment, we need detailed frequency distributions of the duration of employment and of actual hours worked per week or per month for the various groups of employees, in addition to mere summary aggregates and averages.

In the code of the automobile dealers, an attempt is made to guarantee ample profit margins by not only prohibiting the sale of new cars at prices lower than the retail prices listed by the manufacturers, plus various cost items, but also by fixing the dealers' buying prices or trade-in allowances for used cars. The latter provision raises a conflict of interest between the manufacturers and the dealers. Less generous trade-in allowances on used cars have the same effect upon the volume of new-car sales as an increase in new-car prices. It is quickly apparent that if the dealers actually succeed by these means in providing themselves with profit margins greater than those competitively necessary, they will merely be inviting the automobile manufacturers commensurately to reduce dealers' discounts, and, thereby, the retail prices of automobiles.

The dealers, incidentally, have set for themselves the difficult technical feat of compiling and publishing every 60 days the legitimate used-car allowances, based upon actual transactions, for every make and model of motor vehicle, by regional areas.

To illustrate one more type of problem, the code of the motor vehicle parts and accessories manufacturing industry enjoins the members

against selling below cost—the accountants of each establishment being presented with the delicate task of determining the separate cost of each of sometimes numerous products produced by the same plant and personnel, and of determining these costs not for managerial purposes, which is frequently done anyway, but to observe what amounts to a new law.

A number of interesting and perhaps baffling questions immediately arise. Is it safe, under such a provision, to make price contracts in advance? Certainly it is impossible accurately to know one's costs in advance of actual production and delivery.

Shall the costs that are to govern prices include such allowances for depreciation and obsolescence as will force consumers to bear the burden of managerial errors? If not, who is to distinguish between what we may term "normal" depreciation and obsolescence and the abnormal, and by what processes?

Shall a mistaken investment in the past be validated at the expense of consumers by the inclusion in "costs" of an allowance for the amortization of the capital unwisely invested? Or, at the other extreme, shall a concern be permitted to write down its plant values to $1, by surplus adjustments, and thereby be permitted to quote lower prices by reason of the absence of depreciation charges? Or, again, shall we have an independent valuation of all the plants in the industry continuously in process to provide a check on depreciation charges?

Shall unit prices be changed just as frequently as costs change? Obviously the unit cost of output in manufacturing industries varies considerably as production is stepped up from 20 to 80 per cent of capacity.

There are the problems of idle real estate, of surplus equipment brought into use only in times of emergency, of appreciation and depreciation of inventories, among many others.

As I remarked at the outset, the statistical problems raised by the NRA codes are not really new. But the new uses to which we must apply quantitative information and statistical methods give these problems a new significance. They make clear the urgent necessity of filling in the huge gaps in our quantitative knowledge, the standardization of our labor and industrial statistics, and the standardization of our accounting methods in business.

STATISTICS AS A PUBLIC WORK

By Willard L. Thorp

There are a great many problems on which we all have found it easy to hold opinions in the past, but on which more exact thinking has been made necessary by the recovery program. One of these is in connection with the problem posed by my subject—Statistics as a Public Work.

I think all of us statisticians have developed an insatiable hunger and thirst after quantitative data. We have been in the habit of taking the position that any statistical work which may be undertaken by the Government should have our earnest support. And now comes a law which gives the President authority to require "the making of reports and the keeping of accounts." Has the statistician's millennium come at last? But it is now evident that a grant of power may raise more problems than it settles. How far should such a program go? Should the Government carry on direct collection of all data, or should it delegate some or all of the work to trade associations and other private organizations? How should the costs be met? How extensive data should be collected? Should complete coverage be sought? Many such problems, large and small, suddenly demand more exact thinking than circumstances have forced upon us in the past. Most of them have yet to be answered.

Back in the Middle Ages, when economic activity was governed by tradition and custom, statistics were unknown and unnecessary except for an occasional census taken so that the Sovereign might know the possibilities of his war-time strength, or the available sources of taxation.

With the development of the philosophy of laissez faire, statistics entered into a new phase. Under this philosophy, social ends are accomplished because each individual is supposed to act wisely and in his own interest. For the purpose of determining this interest, certain statistical material may be extremely valuable. If his enterprise has grown to large proportions, he must have a record of his own activities, and in many instances he must have records of market conditions, etc., to permit him to make wise judgments. Thus, for example, it appeared proper for the Government to enter the crop forecasting field, as an aid to the market forces in fixing prices which made the best adjustment of supply and demand. It is not surprising, therefore, that there developed during this period an increasing volume of statistical data. Back of it was the idea that individual business men, given more statistical information, could and would make wiser judgments, and the entire economy would benefit. This tended to concentrate attention on data such as production and stocks, which seemed more important to the individual business

man in determining policy, but gave less support to employment, wage, and profits data. It encouraged reporting in concentrated industries, but offered no inducement to the small business man, such as the bulk of the retailers.

These voluntary developments are very limited as compared with those in the fields in which there was some considerable degree of social control. The establishment of the National Banking System at once started the detailed statistical series of bank statements and other data published by the Comptroller of the Currency. The creation of the Federal Reserve Board gave further impetus to the collection and analysis of data in this and allied fields. I venture to say that no agency in the country has contributed more during the last decade to the development and intelligent analysis of statistical data than the Division of Research and Statistics of the Federal Reserve Board.

Exactly the same story covers the history of the railroads. Prior to the establishment of the Interstate Commerce Commission, almost no statistics were available. Some few tonnage records appeared as by-products of freight pools, but, in general, railroad transportation was a statistical blind spot. An essential part of the work of the Interstate Commerce Commission has been to correct that situation. Gradually the statistical record has been expanded and improved. No one can deny that it is an integral part in any program of effective control.

Such a development is, after all, entirely reasonable. Suppose a Government agency finds itself in the position where it must choose between certain lines of action. It desires to decide intelligently. This requires facts. To be sure, the underlying data needed for decision are never exclusively statistical, but oftentimes the description of the situation can only be given in statistical form. It seems to me obvious that statistical data must be greatly multiplied in the next few years if we intend to follow a path in which the Government accepts the responsibility for deciding on many matters of economic policy.

That statistical data are often essential to a wise determination of policy can be readily illustrated by many present situations. At the present time, there is a vigorous demand from certain sources for the Government to give financial aid to the residential division of the construction industry. The proponents argue that this branch of economic activity is absolutely dead and is therefore a large millstone, despite the fact that a serious shortage exists of decent housing facilities. On the other hand, others point to the high level of construction activity in the post-war years and to the vacancy rates at present, insist we have a surplus, and see no reason for aiding residential building. To resolve these claims is impossible without data. This week, field organizations are

being organized to carry on a real property inventory in some sixty cities, under the Bureau of Foreign and Domestic Commerce and the Bureau of the Census, as a Civil Works project. The results of the survey will, of course, not be significant in determining the general policy of the proper extension of Government credit, but they will tell the story on residential needs—the exact vacancy situation, the quality of the vacancies, the degree of over-crowding, the rental structure, and many of the other items so necessary in determining a wise housing policy. This illustration may serve to indicate the impetus given to statistical work by the recognition of Governmental concern over economic conditions.

There are many other illustrations of improved statistical work resulting from the fact that actual decisions are depending upon the data. We can see this in the field of retail prices and cost of living, so neglected in the past. The Bureau of Labor Statistics is making great improvements in these records. Why? Because salaries of Government employees are being adjusted according to the cost-of-living index. Furthermore, information on retail prices is essential to analyzing the progress of the recovery program.

In still a third case, there is the need for more data concerning actual distribution of goods. In the Bureau of Foreign and Domestic Commerce we now have four measures of retail sales which represent, we hope, only the beginning of an attempt to measure the movement of goods into consumers' hands. These particular indexes are based upon chain store sales; but upon sales eliminating changes in the number of units in the chains. We received splendid coöperation on the part of the business community in undertaking these reports, and I hope that we shall soon be able to give them an even wider coverage. There are, of course, a great many gaps in our knowledge, but necessity may force us more and more into the attempt to measure the flow of goods into the hands of the ultimate consumer.

The need for increased statistical reporting, particularly on the part of industries adopting codes of fair competition, has raised squarely the issue as to the proper allocation of this task between the Government and the trade association or Code Authority. There are two extreme points of view and any number of intermediate positions.

On the one hand are those who believe that all statistical work should be concentrated in a Government agency or agencies. The arguments advanced in defense of this position are many: There will be certainty of continual collection; there will be less opportunity for "rigging" the data; methods and definitions can be standardized; the data will be judged on their social utility; the data will be a matter of public record.

On the other hand are those who feel that trade associations are the

recognized administrative units in the recovery program, and that their position will be greatly strengthened by acting as the statistical agency. The advocates claim that the past, when trade associations operated under threatening legal clouds, is no indication of their possible accomplishment. They believe that members will report more freely to their own association and the trade association will be able to make certain that the statistics are in the most effective form.

In general, the whole discussion has uncovered wide fields of emotional fervor. The believers in personal privacy as a property right, the sponsors of industrial self-government by industrial groups, the advocates of a centrally controlled economy, and of course those who bitterly oppose any one of these positions—all find no difficulty in determining their position on the point at issue.

But to me it is not a clear question of "Yes" or "No." Statistical records may be divided into those of significance to the single business man alone, those which are of primary importance to the industry only, and those which bear upon our general economic program and policy.

The concern of the Government increases as the data have wider and wider social significance. The Government, for example, may be very much interested in figures of lumber stocks, but not at all concerned with a break-down by sizes. Yet the industry might find the size data very helpful. One should start with the definition of what data are essential for the purposes of evaluating and determining matters of economic policy. Then, it follows that the Government must, itself, collect or permit others to collect and compile under the most careful check and supervision, the basic data which it needs. Other data which may be valuable to particular groups may be gathered by them. It is extremely disappointing that decision on this whole matter has been so long delayed. This great social experiment is going on, and we are not making extensive scientific observations.

This increased need for statistics raises questions of extent and coverage. There is increased recognition of the necessity for obtaining much more detail on many points than has been collected in the past. I suspect that the technique of sampling will be of increasing usefulness here. We will make extensive surveys at intervals, but much more frequent or more intensive observations of samples. In this way, it will be possible to obtain the details and correlations which are so important.

One of the best illustrations of the need for more intensive analysis of comprehensive series is in the field of wages. For the purposes of the National Recovery Administration, total pay roll figures are by no means ideal. Frequency distributions are needed to determine the size of the group which may be affected by various possible minimum wage

rates. In the collection of our wage data in the past, we have developed little of this intensive data, but have put major emphasis on trying to cover an increasing field with total pay roll data.

A second illustration of this same tendency to gather widely but not in sufficient detail, is the case of residential vacancy figures. We have figures indicating a high rate of vacancies in a great many cities. But the figure alone is worse than useless. There is usually no way of knowing the quality of the vacancies, the degree to which an inflexible rent structure has brought them about, the number of families which are doubling up, and similar significant information. We cannot tell from vacancy percentages whether we have a surplus or shortage of dwellings.

These illustrations merely demonstrate the point that, as might be expected, the emergence of specific problems for which statistical materials are required tends to re-define the character of the statistics which may be needed. Generally this calls for more detail.

There is another reason why the use of the sampling method may come into increasing favor, and that is the burden of reporting on the small firm. We statisticians are apt to forget that statistical reporting takes time and money. Perhaps the best way to meet this difficulty is to use the method of occasional extensive surveys, and more frequent or more intensive studies of a sample of firms carefully selected.

Finally, the expansion of the statistical work of the Government has raised anew a problem which has long been recognized in Washington—the need for coördination of statistical work in the various branches of the Government. This was attempted before by the Federal Statistics Board, but that organization had no funds or staff, and was therefore seriously handicapped from the start. The Central Statistical Board, the first offspring of the Committee on Government Statistics, offers real promise of filling this need. Its members are most unselfishly giving their time and energy in the attempt to make it an effective instrument. Of course its life has been too short to have demonstrated its full capacity, but there is great promise in the organization.

That much can be accomplished by coördination is well illustrated by the real property inventory project referred to above. The funds for the project were allotted to the Bureau of Foreign and Domestic Commerce by the Civil Works Administration. However, arrangements have been made with the Bureau of the Census to carry out all the field work involved. This then divides the project between the Bureau of Foreign and Domestic Commerce, which plans the undertaking, prepares the schedules and instructions, provides technical direction, and will be responsible for analysis, and the Bureau of the Census, which will utilize its experience in organizing and carrying out the field work involved.

STATISTICS AND ECONOMICS

By O. M. W. Sprague

It was with some hesitation that I accepted an invitation to address the American Statistical Association, since I cannot qualify as a statistician. I am merely an economist who has had occasion to make rather frequent use of statistics. Taking my courage in both hands, however, I shall try to indicate to you some of the limitations of statistics that have presented themselves to me in my work as an economist.

Broadly speaking, I have found statistics useful in showing changes in the economic situation, but less useful as a means of indicating why changes have come about, and still less useful as a means of determining what should be done in order to avoid changes for the worse. And even less serviceable have I found statistics when I have been concerned to discover a means of bringing about positive changes for the better.

In the financial sphere, for example, we have statistical information about changes in velocity of circulation, changes in interest rates, in the price level, and data regarding variations among prices of different commodities. Associated with these financial statistics we have industrial statistics showing changes in the physical volume of trade and changes in the relative quantities of different goods and services that are being currently produced. Again, we have data about employment, wage rates, pay rolls and the total money income of the community and its distribution. All of this information has been presented in charts and has been subjected to mathematical treatment designed to show correlations, with allowances for seasonal variations and lags of various kinds.

When the economist, the government official, or the business man examines this statistical material he does not find that it explains why changes have taken place and he is particularly at a loss when he is concerned to discover what, in any given situation, it is desirable to do. Take such a question as this: Would it have been desirable in 1928 and 1929 for the Federal Reserve Banks to have adopted a policy designed to furnish the community with a larger volume of credit at low rates? My own opinion at the time, and it has not changed, was that credit should have been sharply contracted from the spring of 1928. Most statisticians were of a contrary opinion. Statistical evidence can indeed be adduced for the view which I then held, but the selection of the statistical data to support that view does not emerge from the statistics themselves, but from economic analysis. The course of security prices, and volume of foreign loans, construction activities, particularly urban and suburban, the rapid expansion of certain particular industries, and the agri-

cultural situation, seemed to me at that time to indicate unhealthy developments. These developments were in some measure obscured to those who were giving attention to statistical data covering the entire field of economic activities. My own conclusion, from consideration of this and other similar periods, is that in times of abounding prosperity we should concentrate our attention upon statistical data relating to the particular activities that happen to be going forward most feverishly.

In periods of depression, in my judgment, statistical data alone are less serviceable as a guide to action than in periods of activity. Preventive measures are far more effective than curative measures in the economic field. We know perfectly well that when a trade recovery has taken the place of the existing depression a larger volume of credit will be employed, and the velocity of the circulation of the currency will be greater than now. We know that there will be a greater output of goods and services, a greater money income for the community as a whole, larger pay rolls, and so on. Statistical measurement will tell us with more or less accuracy how great the change has been, but I venture to think that statistical data will not very clearly indicate what we should do to bring about this desired change. Such data cannot tell us whether an increase in the metallic base of the credit structure will be a contributing factor or how to bring about a desirable increase in the velocity of circulation, or what influence may be exerted by a further reduction in interest rates, whether for capital or short loans.

Let me take as an example one of the doctrines which seems to be exerting a pervasive influence on policy at the present time, that of consumer purchasing power. It goes without saying that with a trade recovery there will be an increase in consumer purchasing power. But will an increase in consumer purchasing power, however it is brought about, exert a favorable influence on trade recovery? This, I submit, is a problem that can only be answered by economic analysis. Statistics relating to consumer purchasing power afford no indication of the conditions under which its increase may be expected to exert a favorable influence in bringing about a sustained trade recovery.

Up to this point I fear I have been rather lacking in that courtesy which is proper from a guest. You may also say that I have not been particularly constructive, to use a term dear to the financial journalist. I hope, however, I shall be pardoned if now I venture to suggest a line of statistical work which I believe should prove most fruitful. So far as I am aware no detailed statistical examination has been made between any two similar situations in successive business cycles. By and large, statistical analysis has covered every moment of time of the years for which statistical information has been available. I suggest, that it

would be helpful to take for analysis similar moments in two or more distinct periods. Consider, for example, the possibilities of a close comparison of conditions in the first half of 1892 and the first half of, let us say, 1898. In both these years trade was active. But we do not know very exactly what the differences were between these two years. No doubt there was a greater supply of money and credit actually in use in the latter year and very likely there was a greater available supply of unused credit. But analysis could go far beyond such objectives and familiar differences. The output of goods and services was certainly greater in '98 than in '92, and certainly there must have been important differences in the relative output of various goods and services as well as changes in relative costs, in wage rates, and so on. All these differences could be brought to light and measured statistically. Such an investigation, I submit, would indicate the nature of the changes that occurred during the years of depression following 1893, changes that were required in order to make possible renewed trade activity.

In the '90's these changes, whatever they were, took place in large part without government action or planning by the business community. Economic forces still exerted more or less free play. Now we have apparently entered upon a period in which planning is to the fore. Both government and business seem unwilling to allow the free play of economic forces. It, therefore, becomes more necessary than ever before that we determine as definitely as possible the character of the changes that are required in order to permit a recovery in trade. Economic analysis, imagination, and that aid which can be afforded by statistical data, are all required. In the statistical field the selection of significant statistical data requires a close examination of the character of the changes that in the past have taken place between successive periods of trade activity.

SAMPLING ERRORS AND INTERPRETATIONS OF SOCIAL DATA ORDERED IN TIME AND SPACE [1]

By Frederick F. Stephan

Census tract data are receiving increasing attention as objects of social research, and hence the question of the applicability of formulas of sampling to them is pertinent. But beyond this question lie others that are of equal or greater importance.

For purely descriptive purposes these areas and the characteristics of their populations have unquestioned and great value. When, however, the data of census tracts are drawn upon for generalizations and causational inferences, certain difficulties arise. The error formulas have been applied but it is doubtful whether they are in point, any more than they are when used upon the data of time series. Here, as in time series, the conditions of random selection are not satisfied. One assumption, that of the independence of an occurrence in one tract from its occurrence in another (especially a contiguous one) is obviously as false as the assumption that a price on one day is always independent of a price on the preceding day. Data of geographic units are tied together, like bunches of grapes, not separate, like balls in an urn. Of course mere contiguity in time and space does not of itself indicate lack of independence between units in a relevant variable or attribute, but in dealing with social data, we know that by virtue of their very *social* character, persons, groups and their characteristics are interrelated and not independent. Sampling error formulas may yet be developed which are applicable to these data, but until then the older formulas must be used with great caution. Likewise, other statistical measures must be carefully scrutinized when applied to these data, as correlation, gradients, etc.

What is most important at the present time is for the investigator to weigh all the information obtainable, whether quantitative or not, as it bears on the choice between alternative hypotheses. Blind application of any methodology is especially dangerous here. Certain suggestions arising out of the experience of the writer in this field may be put forward:

(1) A vivid and realistic knowledge of the processes of urban growth and change and of populations as distributed in both space and time should be an exceedingly effective guide to valid generalization. This knowledge will be itself subject to revision as the research progresses. Differences between census tracts may reflect (a) movement of popula-

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tion within the city, (b) influx of immigrants and migrants, (c) selective processes separating social types, such as home owner from renter, the childless from families with children, etc., (d) topographic, industrial and other features affecting desirability of areas for residential purposes, (e) epidemics, or local group phenomena, (f) differences in the average age and rate of growth of the population, (g) historical circumstances, (h) peculiarities of the census tract divisions, (i) chance fluctuations at the time of the census, and many other factors alone or in combination. The type of data under consideration will determine which of these is likely to be most significant. The selective action of economic processes is especially interesting but other selective and segregating processes should not be overlooked.

(2) Comparisons between cities should be valuable checks on generalizations drawn from census tract data. In some instances one sector of a city may be compared with other sectors. Patterns and sequences of deviations of like sign may be very significant.

(3) Census tract research will probably be most effective when considered not as a method of study complete in itself but as one step in sequence of investigations.

(4) Certain improvements in collection of data about census tracts should be made.

(5) Certain subdivisions of tract data are especially valuable in separating interwoven factors.

(6) Complexes of associated factors might be isolated and treated as wholes.

(7) Abnormal populations, such as those of business districts, institutions, non-resident groups, should be specially studied.

SOME PROBLEMS IN THE CORRELATION OF SPATIALLY DISTRIBUTED VARIABLES [1]

By Jerry A. Neprash

It is frequently assumed that if traits or conditions are closely associated with one another in their geographic distribution, they are functionally, if not causally, related.

In this concept of culture areas the anthropologists have posited the hypothesis that culture element distributions vary by location, or even by distance. They have also shown that complexes of culture elements, e.g., the maize-beans-squash complex in native America, do not prove thereby a functional or causational relationship between the individual elements. Sociologists and vital statisticians have, on the contrary, dealt with traits distributed by political or arbitrary geographical units, both by averaging and by correlation techniques, as if these areas were quite independent entities. They seem to have disregarded the possibility of culture trait diffusion, and to have neglected the analogy of diffusion in time which is found in social and economic time series. This has happened despite the fact that many of their own studies have shown diffusion, from individual to individual, from group to group, and from district to district. While modern communication and transportation have annihilated space in one sense, on the other hand, as Willey and Rice point out, these have also intensified local contacts. These users of correlation techniques have been inclined to assume that co-existence in the same space involved a causal relationship between two traits.

It is hardly suitable then to use the error formulas of random sampling with data in which the essential condition of independence of the units (in this case, areas) is clearly lacking. This holds true of time series also, as has been pointed out by numerous students.

What is the meaning of a correlation coefficient if the preceding analysis is correct? It is not a measure of the degree of relationship among the variables themselves, but rather a measure of the degree of correspondence in their respective geographic distributions. As in time series we may interpret a correlation coefficient merely as a measure of co-variance in time, so here we have only a measure of co-variance in geographical distribution.

However, even this interpretation of the coefficient of correlation is valid only when the districts are equal in size: equal in geographical extent if degree of correspondence in geographical distribution be de-

[1] Abstract prepared by the Chairman of this session, C. E. Gehlke.

sired; equal in population if the degree of prevalence among the people is wanted. It would also appear that the descriptive accuracy of the coefficient would increase with a decrease in the size of the district provided the district were not made so small as to impair the stability or reliability of the rate. There seems little warrant for an assumption made implicitly in a recent study that the best district to use is the one which yields the highest coefficients of correlation.

There is also the question of the significance of correlation where the area concerned is not homogeneous. Within one heterogeneous area the correlation may be high in one part and absent in another part. This is analogous to a similar situation in time series, as pointed out by Kuznets, wherein the measure of co-variance may be different in different parts of a time series.

Concrete illustrations of this are to be found in recent studies of votes in elections and in straw votes. For instance, the writer found that the correlation between the vote for President Roosevelt and wet-dry sentiment as expressed in the *Literary Digest* poll of 1932 was practically nil when calculated by states, but *within* states or larger and homogeneous areas, it was significant. However, these coefficients varied from one part of the country to another.

In conclusion, the correlation of spatially distributed variables must be accepted with very severe limitations of interpretation. The data involved violate two important conditions of sound application of correlation and sampling techniques—namely, the independence of the units of which the traits are measured, and the homogeneity of distribution of the traits within a given area. The coefficient can be regarded as not much more than a measure of co-distribution of the variables, though even its descriptive value is easily exaggerated.

CERTAIN EFFECTS OF GROUPING UPON THE SIZE OF THE CORRELATION COEFFICIENT IN CENSUS TRACT MATERIAL[1]

By C. E. Gehlke and Katherine Biehl

In 1931 Dr. Henry Sheldon pointed out to one of the writers a tendency for the correlation coefficient to increase in size as the units of census tract areas increased in size from one tract to several, and decreased in number of tracts from 188 to 23. This study carries on the line of empirical investigation suggested by these first results.

This study consists of three parts: (1) a somewhat detailed study of grouping effects in census tract data; (2) an experiment in the effect of grouping in pure chance data, i.e., the results of coin tossing; and (3) an experiment in the grouping of 1,000 rural counties.

(1) The 252 census tracts of Cleveland and its four largest suburbs were grouped successively in 200 areas, 175, 150, 125, 100, 50, 25, so far as possible of approximately the same size and consisting of contiguous territory. When male juvenile delinquency, expressed as absolute numbers, was correlated with the median equivalent monthly rental for the tracts and larger areas, the coefficients of correlation (r) ran as follows: $-.502$, $-.569$, $-.580$, $-.606$, $-.662$, $-.667$, $-.685$, $-.763$; for rates of delinquency, the values of r were: $-.516$, $-.504$, $-.480$, $-.475$, $-.563$, $-.524$, $-.579$, $-.621$. For the correlation ratio (eta) similar, though by no means identical, results were obtained.

When census tracts were grouped at random, rather than by contiguity, in two groupings, the following results were obtained:

252 tracts	$-.502$
150 areas	$-.434$
25 areas	$-.544$

Partial coefficients revealed the same general tendencies, when census tracts were contiguously grouped, as in the case of zero order coefficients.

(2) Twelve coins were tossed in the following manner, giving six series, A, B, C, D, E, F. Series A was a straight toss of twelve, B was made by tossing 8 of the 12 coins tossed in A, counting in B the 4 left lying from A. Likewise C and D were tossed with 4 tossed the second time and 8 left lying to be counted in; E and F had eleven coins common to the two tosses. The theoretical values of correlation of A and B, C and D, E and F, were respectively $+.33$, $+.67$, $+.92$. These were the results when all 500 were used as separate items. When grouped

[1] Abstract prepared by C. E. Gehlke.

by 500, 245, 100, and 25 combinations of tosses, A and B showed the following coefficients: +.334, +.713, +.709 and +.859. A second grouping of the 245 gave a value of +.542. These correlations were all done with groups of fairly uniform numbers of tosses. When the grouping was deliberately diversified in this respect, beginning with 1 toss, then 2, etc., to 10, repeating again and again, r for 93 groups so obtained was +.972, contrasted with a figure of +.334 for individual tracts as units. The lack of uniformity of size seems to be an important factor in providing this result.

(3) The value of farm products was correlated with the number of farmers in 1,000 rural counties (census of 1910). When thoroughly shuffled, the cards containing the data were first used individually, then grouped by sixteens and then by thirty-twos, making 63 and 31 groups. The value of r changed, from 1,000 to 63 to 31 groups, from +.649 to +.859, to +.756. When the grouping was done by states (40 groups) and by eight county contiguous groups, each wholly within a state (125 groups), the results were: +.649, +.725, +.826.

Variations in the size of the correlation coefficient seem conditioned upon changes in the size of the unit used, with a smaller value of r associated with the smallest unit rather than with the largest. Various ways of grouping have considerable influence on the r, as well as has the size of the area. These results raise the question whether a correlation coefficient in census tract data has any value for causal analysis. Does it measure the inter-relation of traits in their ultimate possessors—individuals and families? A relatively high correlation might conceivably occur by census tracts when the traits so studied were completely dissociated in the individuals or families of those traits. While this is an extreme example, it should nevertheless be kept in mind. The ultimate question is whether a geographical area is an entity possessing traits, or merely one characteristic of a trait itself.

THE TRADE INSTITUTES AND CODE AUTHORITIES

By Wilson Compton

The practice of expressing ascertainable facts in numerical terms is not modern, but extensive use of statistics in business and by business men is a development of near-modern history when the theological or authoritarian era gave way to the scientific.

On the need of and the desire for authoritative statistical information was predicated the second oldest permanent trade association in this country, The American Iron and Steel Association, founded in 1855, in Philadelphia; which, after subsequent reorganization, has become the present noted American Iron and Steel Institute. "The general objects of this association," states its first constitution, "shall be to procure regularly statistics of the trade both at home and abroad to provide for the mutual interchange of information and experience, both scientific and practical, and to collect and preserve all works relating to iron and steel generally . . ."

The organization of trade associations or institutes, however, did not keep pace with the growing interest in statistics. While this interest steadily grew, trade association organization lagged. Particular trades or industries made desultory attempts at organization and coöperation during the last four decades of the nineteenth century, but the association movement received its greatest impetus in this century.

With only minor exceptions, the successful trade association of today, regardless of the date of its origin, has received its greatest spur toward efficient organization and function during or since the World War. The rapid mobilization of industry then revealed to business leaders not only the advantages of trade associations but the necessity that such associations be properly fortified with facts. War demands brought realization on the part of the Government of the impracticability of dealing always with individual units in industry. Here trade associations found their greatest opportunity and received their greatest impetus.

This war-time experience not only taught business men the necessity of trade institutes but disclosed to them the advantages of strong organization fortified with knowledge. Witness, as a result, the remarkable ascendency of trade associations during the post-war price inflation period. Many associations were alleged to have used their statistical activities as a means of enhancing prices unduly, only to come to grief, as in the famous, so-called Hardwood Case in 1920. Whether the allegation was warranted, which I doubt, is not now under debate. In any

event, the decisions of the United States Supreme Court threatened for a time to throttle the development of trade institutes. A justified fear was raised that the mere exchange of statistics might be construed as an unlawful act. Many apostles of darkness so believed and so advised. The question was answered authoritatively by the decision in the Maple Flooring Case in 1925, when the Supreme Court declared that the "exchange of price quotations in market commodities tends to produce uniformity of prices in the markets of the world. Knowledge of the supplies of available merchandise tends to prevent overproduction and to avoid the economic disturbances produced by business crises resulting from overproduction."

A not inconsiderable school of thought held then and holds now that the collection, compilation and analysis of statistics is essentially a public function.

There were many reasons why government could serve more effectively in such activity than any group of citizens. Its requests for information carried the weight of recognized authority. For certain purposes it had the power of compulsory extraction of reluctant statistics; and it could promise and perform complete anonymity. There was, however, one drawback. The *opportunity* to do a thorough job imposed upon the government the *obligation* to do a thorough job. The government, even in the meticulous details of statistical service, functions with majestic deliberation. Often its statistical reports have been too belated to meet the useful demands of the nation's business.

The probabilities are that the preliminary government figures for lumber production for 1933 will be available in October, 1934. As against this, the National Lumber Manufacturers Association with an experienced organization of statisticians with ample facilities will estimate these figures for 1933 within a fraction of a per cent of final accuracy (close enough for practical purposes) by the middle of January, 1934, at the latest. It is a fair presumption that this performance will be duplicated by trade associations in other industries. The Government itself in its *Survey of Current Business* issued by the Department of Commerce, uses instead of the deliberate government reports the statistics voluntarily contributed by 114 trade and industrial associations. An indication of the manner in which trade associations have responded to this opportunity is in the Classification and Statistical Survey of the Activities and Services of 500 Associations, compiled by the Chamber of Commerce of the United States in 1931.

This survey showed that, of the 20 principal activities carried on, statistics ranked fifth in order of frequency in the group as a whole, but first among associations in manufacturing and extractive industries;

fourth among wholesale distributors' associations; tenth among financial and professional associations. In retail trade associations statistical reporting is inconsequential. Of the 500 associations reported, 195 carried on substantial statistical activities (121 issued reports on sales or shipments, 101 on production, 99 on distribution, 75 on stocks, 63 on employment and wages, 58 on orders, 55 on prices, and 42 on materials and supplies used by members). This group of 500 associations included 313 of national scope, 59 regional, 75 state, and 53 local. Of the total, 227 represented manufacturing and extractive industries (27 wholesale and 59 retail distributors; 27 financial and professional groups; 66 service industries; and 94 composite industrial memberships).

Many of the trade associations making statistical reports by implication confess their limitations by including with their own reports those of the government or of independent commercial statistical agencies; just as the government by implication has confessed the tardiness of its reports by using trade association statistics for report on current business.

When public attention was abruptly focused upon the group of trade and industrial associations, by the passage of the National Industrial Recovery Act, it was found that approximately 60 per cent of the 1400 larger associations were compiling statistics with at least some approach of regularity. About 200 of this number, according to an estimate by a qualified Commerce Department Official, were evidently capable of discharging any obligations of service in statistical reports likely to be imposed upon them under the National Industrial Recovery Act. Another 200 were inventoried as being almost in the class of the first 200, or with minor improvements of organization and statistical methods, readily capable of being so classed.

The great bulk of statistics gathered and compiled by the more capable of the trade institutions was confined to production, shipments, new and unfilled orders, stocks and prices. Many added figures on subjects which were peculiar to trade practices and customs in their respective industries—such, for instance, as raw material stocks, cancellations of orders, and purchase commitments. Coverage obviously was much more complete in production (mineral, agricultural and manufacturing) than in distribution or consumption.

The creation of these code authorities will affect the statistics gathered by the trade associations chiefly in two ways. The most important is that the associations are now clothed with a novel species of quasi-governmental authority. Instead, as heretofore, of asking information from their members, they are now empowered to require it. The second

is that this requirement of code information now includes members and non-members alike. This has already meant in many industries a great improvement in representative coverage.

Most of the codes of fair competition contain specific reference to the types of statistical data to be submitted. In the first 100 codes approved, 22 demanded sales information, 27 production data, 17 statistics on orders, unfilled or received, 26 on inventories and stocks, 40 on price schedules and 15 on credit terms and discounts. In the field of employment data, 55 codes demanded statistics on hours of work and wage rates, 38 on number of employees, 15 on employees' earnings, 23 on conditions of employment, and 6 on man hours; and 6 codes demanded accurate data on costs.

In the lumber industry the code authority is empowered to publish minimum prices on the various items of the industry's products, provided that these prices do not exceed cost of production.

As an example of new statistical activities of trade associations, the National Lumber Manufacturers Association is now compiling, in collaboration with and as an agency of the Lumber Code Authority (1) bi-monthly statistics on wages, payroll and other phases of employment in sawmills, flooring and hardwood dimension plants, wooden package and other timber products industries; (2) weekly, monthly and quarterly reports on production and distribution for quota purposes; (3) a weekly trade barometer; (4) a 4-weekly analysis of expected production and consumption; and (5) a quarterly analysis by regions of production, stocks and consumption reported to the Timber Conservation Board in the Department of Commerce, recognized already as essential in administration of the Lumber Code.

The National Automobile Chamber of Commerce, which formerly published figures only on automobile production, since becoming the Automobile Industry Code Authority, has made a monthly classified report of retail sales, factory sales, exports, advertising expenditures and employment statistics showing the number of employees, wages and hours, total payroll, and average earnings. (The Silk Industry Code Authority, in addition to a weekly report on production, now reports machine operation, wages and hours, total payroll.) The National Fertilizer Association, which formerly reported only on shipments and stocks, now publishes a statement of cost formulation, sales, payroll analysis and credit outlook.

Business men dependent for guidance under the Codes on this information demand that these statistics be authentic and dependable. More and more they are measuring up to that standard.

The spirit, and the purpose, of the National Industrial Recovery Act,

publicly declared by the President and by the Administrator, is to invite, to encourage and to facilitate industrial self-regulation under government sanction and supervision. The nature and scope of the statistical establishment which the industries may gradually develop, will largely determine the quality and effectiveness of industry code administration.

Accordingly the National Recovery Administration has, within the past few weeks, established a Code Authority Organization Committee. Its functions in general are to secure the establishment promptly within industries under codes, of qualified administrative agencies, competent to promote within each industry the normal functions of orderly industry planning, as well as to administer the pathological functions of code compliance. Further, with the aid of the Division of Code Authorities and Trade Associations it is seeking greatly to extend the range and coverage of the permanent trade association establishment of American industry; and to improve its performance. This has great possibilities in terms of larger and more competent facilities for fact-finding and analysis.

This Committee will recommend to all Code Authorities that they qualify themselves to conform to certain minimum standards including standards for Code Statistical Reports. These, of course, are tentative and subject to revision after the test of experience. These recommended standards will include in substance, the following recitals which will be of considerable interest to a company of statisticians:

1. The major purposes of code statistical reports are either (a) to provide the means for industry analysis and orderly industrial planning (normal code administration); or (b) for code compliance. The two purposes are distinct. Industry analysis and planning are based primarily on statistical and other reports. The administration of code compliance is based primarily on complaints.
2. The information needs of the industry itself are therefore the primary objective to be sought in each statistical program.
3. Code statistical forms and content should be adapted, so far as practicable and consistent with the above objectives, to the forms used in reports required by other Federal and other public agencies.
4. Forms proposed by a Code Authority for the reporting of statistics pertaining to code administration are subject to such modifications as may from time to time be suggested by the National Recovery Administration with the advice of the Central Statistical Board.
5. The National Recovery Administration may at any time inform

itself on the methods used by the Code Authority in collecting, compiling, and analyzing statistics.

Omitting the specific statistical standards and the enumeration of the recommended minimum types and periods of code statistical reports from industry and commerce, perhaps I may mention two other recommendations of considerable general interest:

1. A Code Authority administering a code containing substantial price or quota provisions, or provisions authorizing restriction of production or capacity, should seek, directly and through its administrative agencies, the coöperation of persons subject to code in voluntarily supplying to agencies of the government on request, available financial information of economic significance and serviceable for purposes of general industry planning, such as: (a) published balance sheets; (b) income and profit and loss statements; (c) expense schedules with the understanding that individual financial reports and reports capable of individual identification submitted voluntarily for the foregoing purpose will be confidential.
2. It is recognized that statistical schedules of many industries under codes are already greatly in excess of the suggested minimum standards. A Code Authority is expected itself to initiate and develop practical data in excess of these suggested minimum standards.

It is expected that the competence of Code Authorities and Trade Associations to act as agencies of industrial self-regulation will be determined primarily by the extent to which in good faith they meet these and other recommended standards for code authorities. Most industries will in time substantially meet these standards.

The Code Authorities and Trade Associations administering codes, under public sanctions and supervision, will, I believe, inevitably become greater national economic information facilities. Their great field will be in current business statistics. The basic comprehensive data, the statistical anchor posts indispensable to useful statistical analysis, comparison and application, must in general, I believe, be provided by the government.

THE CODE AUTHORITY IN COÖPERATION WITH NRA OR A GOVERNMENT BUREAU

By Roy A. Cheney

The situation in which most industries find themselves today, is due mainly to the lack of knowledge on the part of manufacturers, first of conditions in their particular industry as a whole, and second conditions in other industries in this country or abroad, which have a direct or indirect effect upon their own industry. This ignorance includes not only manufacturing and costs but market items as well.

It is my belief, in business as in government or in any other human relation, that as population grows and countries as well as individuals become more crowded and the methods of carrying on business or carrying on government become more complex, the individual, whether a person, firm or corporation, must give up some of his individuality for the good of all concerned. This we have seen to be true in the rise of civilizations and in the newer forms and methods of government. Unless these tendencies have been carefully watched and guarded, the situation studied and understood, the nostrums and panaceas carefully avoided, the structures of business, civilization, etc., have fallen of their own weight.

Our troubles have come from a lack of facts, from lack of understanding of them, and a lack of a sound prognostication as to what those facts may mean for our industry and for our own mills and factories in the future. Some persons, of course, do not believe in the necessity for facts.

From the experiences which I have had, I believe it is vitally necessary, first, to determine facts and to determine them in such a way that our people will have confidence in them; second, to teach how the facts may be used, and third, to see that they are used in formulating and carrying out policies.

Also, I sincerely believe that every member of a group must be raised to the same level of understanding and have access to the same information that every other member of the group has, if the group is to be prosperous as such and is to furnish prosperity for the individuals. We, of course, have all sorts and conditions of men at the heads of our plants. Some of these men will not be agreeable to a change in their business ideas or business methods, but it is my frank opinion that unless they do so they are doomed to go out of business or they themselves will be replaced.

Next, we have the duty of finding out how these facts can be gathered

in the most economical way and gathered so that persons will have faith in them.

Our last job is to teach understanding of the facts and how to act upon them.

The whole matter seems to me to be a question for research, and then a matter of teaching, and then of follow-up to see that the teachings are carried out.

Outside of the prosperity of our plants and our own security in the matter of making money for our stock holders and ourselves, is the further fact that the great mass of employees in industry today are not the docile uneducated mass they were perhaps twenty or twenty-five years ago. Most of our employees are educated and are thinking and I am wondering how long they will permit our present rule-of-thumb method of operating our plants to continue. Manufacturers have a duty not only to earn a proper return upon the money invested, but they also have a duty to furnish fairly steady employment at reasonable wages to those to whom they offer work. This duty perhaps was not clear nor so imposing in the more or less pioneering days in this country, but with the complexities of our growing civilization and the passing of our pioneer stage of development and the necessity for careful coördination of mill with mill and industry with industry, the safety of the state and the safety of all property depend upon the most careful management and careful planning in this regard.

Further, I think that the mere ascertaining of correct facts, either costs or economic, is useless unless reasonably correct conclusions are drawn from those facts and the conclusions as well as the facts themselves directed toward and impressed upon the group and individuals in the group.

All of the above gets down to the point that we must gather accurate facts and figures upon which to base accurate and sound judgments. This leads to the question as to the best methods and the best authority to gather such facts.

From long experience I believe that facts can best be gathered by the trade group in coöperation with the government, if for no more than the simple reason that heretofore the government has been collecting its facts on the one side often times unaided by industry, and industry, itself, has been collecting similar or more detailed facts on the other side without the help of the government. We all recognize that proper facts are necessary for the working of the government. It is becoming recognized that industry must have more facts for its own preservation. Therefore why not bring the two together?

It has been stated that the government does not know what facts it

wants. This can be cured very quickly and very easily through coöperation between industry and government. If the government will ask of industry the help and coöperation which industry is usually ready to give, both will be rewarded by better, useful and more accurate information.

It has been stated that the NRA is not adequately staffed to handle statistical returns. This may be true. The immediate and obvious answer is that the NRA should be properly staffed. On the other hand, I respectfully suggest to the government that it utilize the bureaus and divisions already set up, staffed by trained men with intimate knowledge of industry gained over years of experience. And I suggest to these trained men, if such a suggestion is necessary, that they give the New Deal the accord which industry is recognizing as due to it.

The usual reaction from business men when called upon to give information is that it would be burdensome and expensive. I think it comes not from careful thinking but from the competitive complex instilled in them from their experience in keeping down costs and keeping away from extra activities. The answer, of course, is simply that if the information is necessary—and the necessity thereof can be determined by coöperation between industry and government—it must be gathered and the burdensomeness and the expense of gathering it will be lost in the profits gained by the possession of it.

This feeling on the part of business men is no doubt founded also on their experience with some statisticians and economists who, I fear, lose sight of the fact that their work and the results must be practical, and lose themselves in the intellectual delight of their mental exercise.

Fundamentally, everything which pertains to business, industry and commerce must show a profit and in turn profit means no more or less, in the final analysis, than the wherewithal to buy food, clothing and security. Unless statistics, which are an accessory to this end, justify themselves they are worse than useless.

I have left to the end the thing which appeals most to business men and that is the lower cost to the trade group where it coöperates with such a splendid body of men as is found in the United States Bureau of the Census. Through the coöperation of the trade groups which I represent with the Census Bureau, the trade groups have been saved a great deal of money, and beside this financial advantage, we bring to our aid some of the best minds in the country in every phase of our statistical and economic problems.

WHO SHOULD COLLECT ECONOMIC STATISTICS FOR RECOVERY AND PLANNING?

By Isador Lubin

The answer to the question, "Who should collect economic statistics for recovery and planning?" depends upon what one means by planning, and who is to do it.

If one conceives of our economic system as automatically regulated; if one looks upon private property as sacred, and subject only to the control and disposition of its owners; if one thinks of economic activity solely as a resultant of the play of individual decisions; in short, if less, little or no government in business is our ideal, our problem is simple. Let every business man and investor make his own decisions as he sees fit. Let him base these decisions on such information as he can get by his own efforts and the efforts of his associates. Let the government look upon itself as an instrument entirely divorced from business and concentrate its attention on maintaining the peace and safety of its subjects.

If, however, one conceives of the owners and managers of business and industry as the trustees of the people; if one is somewhat skeptical of the efficacy of competition as an instrument for assuring to society the maximum supply of goods of the best possible quality at the lowest possible price; if one questions even to the slightest degree the motives of those who at one moment insist on the competitive machinery as the regulatory force in economic activity and at the next moment proceed to do everything in their power to secure monopolistic advantages for themselves; if perchance one doubts the possibility of competition ever prevailing without supervision and control by some body outside of industry itself; or if one looks upon the State as an instrument for protecting its citizens against the maladjustments that regularly result from the mismanagement of investors and industrial managers—if, in other words, the State is to have any hand in the planning and control of industry—then one cannot help but conclude that it must have available trustworthy and timely statistical information concerning the trend of economic events.

To those of us who are of the conviction that the State must have some hand in the control of industry the question arises: Can the necessary trustworthy and timely information be available to the State if collected by industry?

Economic information collected by industry has been concerned in almost all instances with the affairs of specific industries. Indeed, up

until recently, the large bulk of such statistics was limited to production and prices. The trade organization that had the staff capable of appreciating the significance of statistical data was rare. As recently stated by a former official of the NRA: "The only figures the average trade association executive was interested in were output figures. He wanted them so that he would know how much to assess each plant for dues."

With the advent of the NRA, trade associations have undergone far-reaching reorganization. Many of their leaders have become conscious of the fact that to shoulder the responsibilities of code enforcement will require knowledge of what is happening within their individual industries. They are aware of the fact that the administration of their codes will necessitate statistical information. Just what statistical information will be required and how it shall be collected is still, however, a mystery to many of the code authority executives. Few of them have more than the vague idea that they must collect figures. How to organize for their collection, the size and type of the staff required, the methods of tabulation and analysis—these are beyond their comprehension. Typical of the existing situation are the secretary and counsel of one important code authority who recently complained because government field agents had been sent into the offices of their members to secure hour and wage data for a sample of the industry. They stated that they themselves had been planning to secure the same information for the entire industry. A sample, they insisted, would not be sufficient; they were going to send questionnaires to every firm in the industry. And this is in the face of the fact that trained field agents with years of accounting and payroll experience had been having difficulty, even with the assistance of the officials of the companies themselves, in making head or tail of the payrolls from which the data were to be secured. To secure wage and hour data of any value for even half of the firms in the industry in question would require a full time, highly trained field force of more than one hundred men. Is any code authority either willing or in a financial position to do this?

Even if the individual code authorities were in a position to collect the information necessary to their efficient operation, would it be good policy to relinquish to them the collection of all statistics concerning their industry?

Personally, I feel that the answer must be "No." In the first place, the present recovery program is still experimental. Irrespective of our desires as to its permanency, it is necessarily of a tentative character. Many of its policies are temporary. If we relinquish to trade associations the function of collecting statistics now gathered by government

bureaus, and later make any marked changes in the recovery set-up, we may find ourselves without any data at all.

In the second place, the data required for the policing of codes—and it is in such data that the code authorities are primarily interested—are not necessarily the type of information required for the efficient planning of industrial activity. Enforcement information must be detailed. It must concern itself with the activities of the individual firms and the condition of employment of individual workers. Industrial planning, on the other hand, requires information of a more general character, information which covers more than a given industry.

Third. Most code authorities are in no position to plan for their industries, even though they may be in a position to secure the necessary data. Some industries are blessed with two, three, and even more trade associations. Although subject to uniform requirements as to trade practices, wages and hours, these associations act independently and report only on those matters that they are compelled to. One could cite cases where a given section of an industry has agreed to a proposed code only on the condition that it could retain its separate entity.

Fourth. The public interest may be in direct opposition to the interest of the individual members of any industrial group. A case in point is a group of firms, which, in 1929, by shifting the ownership of their inventories from a raw material producing corporation to a group of processing corporations which they controlled, were in a position statistically to underestimate the stocks of raw material in the hands of the industry and thereby protect their market.

Fifth. Effective public policy is dependent upon continuous and comparable data. Changing control within trade associations and code authorities and disruptions within given trade groups are a constant threat to the essential continuity and comparability of data. The withdrawal of a single large firm from a trade association and the cessation of its contributions to the exchequer may in some instances seriously cripple the statistical activities of such an association.

Sixth. Industrial planning and public policy are concerned with far more than is happening in a specific industry. They are concerned with the entire economic order. It is necessary, therefore, not only that data be available for every line of economic endeavor, but also that the data for each field be comparable. They must be of uniform date; they must be of uniform quality. As envisaged at the moment, little comparability exists in the data it is proposed the code authorities collect. Some codes provide for the collection of figures for certain items each week, some every four weeks, some monthly.

Many of the existing government agencies have had many years of

experience in the collection, tabulating, and interpreting of economic statistics. Many of their services are of long standing and of a quality which only long experience can make possible. These agencies command the confidence of those whose interests may be affected by the data they collect. The firm that furnishes them with reports knows that no competitor stands to gain from any information it may submit. These agencies, also, command the confidence of labor, in the knowledge that none of them has any private interest to serve by the manipulation of the data collected.

Irrespective of the intentions of those in control of the code authorities, their data will always be questioned by those who feel that some one has a private interest in what their statistics show. If government is to base its policies and plans on statistical information, it cannot allow itself to become dependent upon data the integrity of which is questioned by any large portion of its citizenship.

All of this is not to say that trade associations and code authorities should not collect statistical information. A clear demarcation should, however, be made between that information which bears upon the public interest and that which concerns the enforcement of codes and the making of business judgments. Statistics used to guide government legislation and governmental policy must be beyond suspicion. To attain this end, the collection of such data must be in the hands of individuals and bureaus which have nothing to gain by what the figures show.

DISCUSSION

By Morris A. Copeland

You have heard a variety of advantages both in government and in trade association collection of statistics under codes of fair competition. It would not be difficult to add to the list. Thus, on the one hand, the government at present has neither the interest nor the competence to handle some of the minute details which industry requires. On the other, collection of employment and payroll data by code authorities when a business may be under as many as fifty different codes is clearly an unwise arrangement.

In considering the question of allocation of statistical work, it is important to recognize that industries differ. Some are to a greater degree than others vested with a public interest. Codes differ from one another. Some are properly called codes of fair competition; others look toward a central industry policy on price or production. Code administrative agencies vary from trade associations to something which is close to being an arm of the government. Finally, statistical information collected under codes is to be used for a variety of purposes. The following four are particularly important: (1) to enforce the code, (2) as a basis for decisions by business managements, (3) for understanding changes in general business conditions, (4) as a basis for judging the functioning of the code or for amending it. (1) partakes both of a private and a public character, depending upon the nature of the code provisions; in (2), the private interest predominates; in (3) and (4), the public interest predominates.

Dr. Compton has suggested that in determining a statistical program the special interests of the industry should receive primary consideration. On the contrary, the public interest should be considered above any special interest.

The variety of conditions and purposes referred to above suggest that we should not attempt to handle the problem of allocating statistical work by any single formula, but that we should adopt a flexible policy designed in the case of each industry and type of information to take account of the pertinent advantages and disadvantages involved in the several possible alternatives. The following suggestions for principles to be employed in allocating statistical work are commended to your consideration:

(1) Those existing information services now conducted by permanent governmental agencies which are essential for public purposes should be continued and improved. The maintenance of their

mailing lists should not be endangered by the development of unnecessary duplicate services. Such essential services should be authorized on a compulsory basis under Section 3(a) of the National Industrial Recovery Act.

(2) All report forms used by each code authority should be such as to meet the technical approval of an appropriate government agency.

(3) Where data collected by a code authority or its agent can be adapted to provide information suitable for governmental uses, arrangements should be made which, in the opinion of an appropriate government agency, are satisfactory to meet the needs of these governmental uses.

(4) All information collected by authority of any code should at all times be accessible to some appropriate government statistical agency on the understanding that such information is confidential.

(5) The collection of information for purposes of understanding general business conditions and of understanding the functioning of codes ordinarily should not be combined with the collection of information for code enforcement purposes. If such a combination is attempted, the plan should provide for checking the reports by an adequate system of field audit, and for suitable penalties against falsification and the withholding of information.

(6) Information used or to be used for understanding how any code is functioning, or in order to determine what amendment may be needed in the public interest, should be obtained by inquiries which are conducted directly by the government or by some impartial agency approved by the government.

A STATISTICAL ANALYSIS OF THE FOOD REQUIREMENTS FOR THE POPULATION OF THE UNITED STATES

By Hazel K. Stiebeling

The subject of food and food requirements is of perennial interest both because food is a primary necessity of life and because it is our chief agricultural product. But in times like these the matter has special urgency. Individual families, and the agencies assisting them, want information on food selection in order to safeguard health and efficiency. Economists and administrators need a sound basis for setting goals in agricultural production. In neither of these problems can we depend solely on present food consumption habits for guidance. We would not wish to ignore what may be learned from long established food customs representing the accumulated experience of the race, but we must make use of the knowledge of human food requirements which the scientific research of recent years has given us. The results of this research would scarcely justify placing too great reliance on empirical human experience in matters dietetic. In guiding consumer choice and in adjusting production and distribution to meet it, we should consider what constitutes a desirable regimen, according to our best knowledge of food and nutrition.

For many years chemists and physiologists interested in nutrition have been studying the human requirements for food. According to our present knowledge, diets that yield the proteins of good quality, the essential minerals and vitamins, as well as the necessary energy-yielding food must contain between 35 and 40 distinct chemical entities, none of which are manufactured by the body, and none of which can be used interchangeably. Fortunately for those who plan diets, many of these nutrients are so widely distributed in common food materials that there is little danger of shortage in freely chosen diets. On the other hand, some are very unevenly distributed, and unless care be taken in food selection, will be meagerly supplied.

The actual amount of each nutrient needed, together with the proportion of each in the diet, has been and still is the subject of many investigations. We have learned much about the demands which the body makes for different nutrients at different stages of development, and how size, sex, and the intensity of muscular activity affect food requirements. There are, of course, wide variations in the requirements of individuals and wide variations in the composition of food materials as eaten. The latter are due in part to variable conditions of culture, and in part to varying methods of handling and cooking. Hence it is very important that we do not hew too close to the mark in translating our knowledge

of minimum food requirements and average food values into the pounds and quarts and dozens of common articles of food which enter everyday diets. We must have a goodly margin of safety over the minimum; how wide it should be in the case of any given nutrient depends partly upon how well the body can deal with surpluses, and partly on whether it can advantageously store reserves.

Table I, taken from a new United States Department of Agriculture publication, shows for nine age and activity groups what would seem to be equally generous allowances of each of several food values. To be sure, the factors listed in the table are not the only ones which must be considered in planning diets, but they are those regarding which we have some information with respect to human requirement or some quantitative information on their distribution in common food materials, or both.

TABLE I

QUANTITIES OF NUTRIENTS FOR INDIVIDUALS PER DAY, USED IN COMPARING THE ADEQUACY OF THE FOUR SUGGESTED DIETS

Individuals by age, sex, and activity groups	Dietary allowance in—						
	Energy value	Protein	Calcium	Phosphorus	Iron	Vitamin A	Vitamin C
	Calories	Grams	Grams	Grams	Grams	Units	Units
Child under 4 years	1,200	45	1.00	1.00	0.006–0.009	3,000	75
Boy 4–6; girl 4–7 years	1,500	55	1.00	1.00	.008– .011	3,000	80
Boy 7–8; girl 8–10 years	2,100	65	1.00	1.00	.011– .015	3,500	85
Boy 9–10; girl 11–13 years	2,400	75	1.00	1.20	.012– .015	3,500	90
Moderately active woman; boy 11–12 years; girl over 13 years	2,500	75	1.00	1.20	.013– .015	4,000	95
Very active woman; active boy 13–15 years	3,000	75	.88	1.32	.015	4,000	100
Active boy over 15 years	3,000–4,000	75	.88	1.32	.015	4,000	100
Moderately active man	3,000	67	.68	1.32	.015	4,000	100
Very active man	4,500	67	.68	1.32	.015	4,000	100

In suggesting these allowances for individuals in different age, sex, and activity groups, an attempt has been made to keep the energy allowances as close as possible to what seems to be actual average requirement; to allow for proteins and the specified minerals a margin of safety of approximately 50 per cent; and a wider margin for the vitamins (about two- or three-fold for vitamin A, and four- or five-fold for vitamin C). The allowances for energy have been kept close to actual requirement, because the body stores a surplus of energy-yielding food mainly as fat, and an excess of fat soon becomes burdensome. In its normal functioning, however, the healthy body can easily care for such excesses of proteins, calcium, phosphorus or iron as are likely to occur in everyday diets—either through elimination or storage. So far as vitamins are concerned, an excess of vitamin A in the diet is desirable

since it may be stored to the great advantage of the body in time of stress; and a large margin of vitamin C is planned for, because the vitamin C values of food materials may be greatly lowered by handling processes between production and consumption.

Another and very important reason for not conforming too closely to what would seem to be minimum food requirements in diet planning is our knowledge that in respect to many nutrients, the allowances which will maintain "average" health are probably far below the quantities which would enable man to attain his highest potentialities. For many years the scientist in his laboratory has been exploring the zone between minimal and optimal food allowances—particularly the zone between those allowances which maintain an "average" state of nutrition and those which maintain a better-than-average state. His data lead him to conclude, and his conclusions are confirmed in broad human experience, that the diets of the masses may be measurably improved by enrichment in certain mineral and vitamin factors—calcium, and vitamins A, B, C, and G, especially. Certain foods, notably milk and green leafy vegetables, are often called "protective" foods in view of their importance in three or more of these respects.

The quantities and proportions of nutrients indicated in Table I take account both of laboratory findings regarding nutritional needs, and of observations of the food consumption of healthy, well-nourished individuals and family groups. Whether or not the allowances of Table I are high enough to promote optimal nutrition, it is difficult to say. Undoubtedly, however, they represent diets more generous in certain important nutrients than diets used by many persons today. For example, only 8 per cent of the diets of farm families studied by Atwater and his coworkers between 1894 and 1904 met in every respect the dietary allowances shown in Table I, only 40 per cent of farm family diets studied by the Department of Agriculture in 1917–19, and less than two-thirds of the diets of the fairly prosperous farm families studied by Cornell University in 1926-28, met these allowances. This situation may be due in part to ignorance and established habits or tastes, neither of which is insuperable, and it may be due in part to apathy, which is less easily overcome. But in the case of farm families (who produce for home use 40 to 75 per cent or more of their food) it points to the need for education in the planning of home production programs. Undoubtedly the diets of city families are also in need of improvement. In a study made recently by the Association for Improving the Condition of the Poor in New York City, it was found that in a group of 100 low-income families who had not been influenced by special nutrition education, the diets of more than half did not equal in every respect the dietary

allowances indicated in Table I. The proportion of unsatisfactory diets was much lower, however, in a group of families that had had the benefit of education in food selection, but whose economic status was similar.

When it comes to interpreting dietary allowances such as those shown in Table I, in terms of quantities of common food materials, every student of food composition knows that there is no one dogmatic answer. Many foods can be used alternatively, depending upon their availability and relative cost. Among the grain products, for example, one family may give more prominence to wheat, another to oat products; or in the case of lean meat some households may prefer pork, others lamb, and others beef, depending on which is the cheaper or the more available, or which preferable from the standpoint of family tastes. In translating dietary allowances into food lists, it seems preferable, therefore, to state suggestions mainly in terms of important groups of foods, rather than in terms of specific commodities.

During the past few years requests for diet plans have come to us at the United States Bureau of Home Economics from many different groups—from welfare agencies, teachers, and extension workers, who are engaged in helping families; from individual families themselves; and from economists and others concerned with adjustments in wages, or

TABLE II

ADEQUATE DIET AT MODERATE COST: APPROXIMATE YEARLY QUANTITIES OF FOOD FOR INDIVIDUALS OF DIFFERENT AGE, SEX, AND ACTIVITY

Item	Child under 4 years	Boy 4 to 6 years; girl 4 to 7 years	Boy 7 to 8 years; girl 8 to 10 years	Boy 9 to 10 years; girl 11 to 13 years	Boy 11 to 12 years; girl over 13 years; moderately active woman	Active boy 13 to 15 years; very active woman	Active boy over 15 years	Moderately active man	Very active man
Flour, cereals.....lbs.	60	80	110	120	120	170	230	220	290
Or—									
Bread.....lbs.	50	75	100	120	120	190	240	240	350
Flour, cereals.....lbs.	30	30	40	40	40	40	70	60	60
Milk, or its equivalent [1]..qts.	365	365	365	365	365 [2]	365 [2]	240	182	182
Potatoes, sweet potatoes.lbs.	100	100	100	110	125	160	300	160	350
Dried beans, peas, nuts..lbs.	...	7	10	15	15	30	30	30	35
Tomatoes, citrus fruits..lbs.	75	75	75	90	90	100	100	100	100
Leafy, green, and yellow vegetables.....lbs.	60	75	90	90	110	110	100	100	100
Dried fruits.....lbs.	7	10	15	20	25	30	45	35	40
Other vegetables, fruits..lbs.	90	100	125	150	175	270	300	270	270
Fats [3].....lbs.	10	15	28	35	42	65	80	65	95
Sugars [4].....lbs.	7	15	30	40	45	75	115	75	115
Lean meat, fish, poultry.lbs.	...	25	60	75	90	110	150	125	150
Eggs.....doz.	20	20	20	20	15	15	15	15	15

[1] Approximately equivalent to the food value of 1 quart of fluid whole milk: 17 ounces of evaporated milk; 1 quart of fluid skim milk and 1½ ounces of butter; 5 ounces of American Cheddar cheese; 4½ ounces of dried whole milk; 3½ ounces of dried skim milk and 1½ ounces of butter.

[2] For the adult woman this may be reduced to 182 quarts. For pregnant or nursing mother it should be increased to 365 quarts.

[3] Including butter, oils, bacon, and salt pork.

[4] 1 pint (1½ pounds) of molasses or heavy cane or sorgo syrup is approximately equivalent in fuel value to 1 pound of granulated sugar. The unrefined molasses and syrups are also valuable for their calcium and iron content.

with problems of production and distribution. No single plan could serve to guide practice under such varying situations. Hence, we evolved four sets of diet plans; these include a restricted diet for emergency use; a presumably adequate diet at minimum cost; a more fully adequate diet at moderate cost; and a liberal diet. As an example of our basic material, the plan for individuals in different age, sex, and activity groups according to a "moderate-cost" diet is shown in Table II.

Once food lists are compiled for these groups of individuals, it becomes a mere matter of arithmetic to compute the allowances necessary for the 122 million persons comprising our population, using data from the census of 1930 on the proportion of the population in different age, sex, and occupational groups. Since the quantities of foods needed by 122 million persons are too large to comprehend readily, the total needs have also been expressed on a per capita basis. Table III shows the four diets we have suggested in per capita terms.

TABLE III

FOUR DIETS: APPROXIMATE YEARLY QUANTITIES OF VARIOUS FOODS OR GROUPS OF FOOD NEEDED PER CAPITA FOR THE POPULATION OF THE UNITED STATES

Item	Restricted diet for emergency use	Adequate diet at minimum cost	Adequate diet at moderate cost	Liberal diet
Flour, cereals ..... lbs.	240	224	160	100
Milk, or its equivalent ..... qts.	155	260	305	305
Potatoes, sweet potatoes ..... lbs.	165	165	165	155
Dried beans, peas, nuts ..... lbs.	30	30	20	7
Tomatoes, citrus fruits ..... lbs.	50	50	90	110
Leafy, green, and yellow vegetables ..... lbs.	40	80	100	135
Dried fruits ..... lbs.	10	20	25	20
Other vegetables, fruits ..... lbs.	40	85	210	325
Fats (including butter, oils, bacon, salt pork) ..... lbs.	45	49	52	52
Sugars ..... lbs.	50	35	60	60
Lean meat, poultry, fish ..... lbs.	30	60	100	165
Eggs ..... doz.	8	15	15	30

Even at a glance these diet lists show striking differences. For example, take the flour and cereals. The restricted diet calls for 240 pounds per capita per year, and the liberal diet for less than half as much, 100 pounds. This illustrates, of course, a well-known fact that the less money there is to spend for food, the greater is the dependence on the staple national cereal, whether it be wheat, corn, rice, or oatmeal. Larger quantities of potatoes, the dried legumes and the dried fruits appear in the low-cost diets than in the more expensive diets. But of other vegetables and fruits, of milk, lean meat, poultry, fish, and eggs, the recommendation runs the other way. The liberal diet has twice as much or more of these foods.

From the nutritive standpoint, three of these diets are believed to be

fully adequate. They meet the allowances shown in Table I and furnish enough of the nutrients so far discovered and measurable in quantitative terms, to provide for growth, to maintain health, and leave a goodly margin for safety. The restricted diet covers minimum requirements but allows a lesser margin of safety than the allowances shown in Table I. Table IV shows the extent to which these four diets meet the dietary standards presented earlier.

TABLE IV

NUTRITIVE CONTENT OF FOUR SUGGESTED DIETS, IN TERMS OF PERCENTAGES OF THE DIETARY ALLOWANCES SHOWN IN TABLE I

Classification	Percentage of dietary allowance provided with respect to—						
	Calories	Protein	Calcium	Phosphorus	Iron	Vitamin A	Vitamin C
Restricted diet for emergency use....	95	110	94	100	85	72	90
Adequate diet at minimum cost.....	106	131	142	140	103	133	124
Adequate diet at moderate cost.....	106	124	140	128	111	150	177
Liberal diet.....	104	128	141	131	117	171	217

As can be seen from Table IV, the restricted diet for emergency use does not provide the fairly wide margin of safety called for in the allowances given in Table I, except in the case of protein and phosphorus. The three adequate diets, it will be noticed, are very much alike in fuel value, protein, calcium, and phosphorus content, but the iron and vitamin values are higher in the more expensive diets due to the larger proportion of vegetables and fruit, eggs and lean meat. Except in fuel value, in which the margin is limited to about 5 per cent for household waste, each of the three adequate diets has very generous allowances of the specified nutrients, allowances which approach the optimal, perhaps. In addition to furnishing these extra food values, the more expensive diets have the advantage of making possible more flavorful, varied, and attractive meals.

The present retail costs of these four diets range from about $65 to $175 or more per capita per year. The figures just quoted were obtained when very modest selections were made within the different food groups. It is possible, of course, to increase the cost of any diet very greatly by selecting out-of-season, or fancy quality goods, or food which has been processed, packaged or handled in a costly manner.

Judging from family living studies, the majority of families in the United States spend for food about as much as they would have to pay for the minimum- or moderate-cost adequate diets. Making due allowances for price changes, the families of many skilled wage-earners and business and professional workers between 1922 and 1929 were spending

enough for food to give them the liberal diet. These facts show that the diets here recommended are not out of line with usual food expenditures, but the nutritive content of the suggested diets is much higher than most families secure with their present food selection habits.

The problem of satisfactory diets is, then, not only one of purchasing power; it is also one of education and of the supply of agricultural products. Undoubtedly our national resources of land and labor are such that we could produce food enough so that everyone could have a fully adequate diet. Such a program would, of course, require adjustment in agricultural production—how much adjustment and the direction of it depending partly upon which dietary level we achieve. The minimum-cost adequate diet with a relatively small proportion of animal products, and a fairly high proportion of grain products would require much less land to produce than would the liberal diet, with its relatively high content of vegetables and fruit, and its large proportion of dairy and livestock products. According to preliminary estimates made by Dr. O. E. Baker, about 1.5 acres, exclusive of grazing lands, would be required per capita per year to produce the adequate diet at minimum cost; for the adequate diet at moderate cost, the requirement would be 1.8 acres; and for the liberal diet, 2.1 acres per capita. These figures are based on the average per-acre yields of different commodities in this country during the 10-year period, 1917–26. Calculated on the same basis, 1.9 acres would be required to produce the food apparently consumed per capita per year during the period, 1927–31. (These figures are, I understand, subject to revision as further studies are made of the wastes involved in distribution.) Whether we can succeed in the program of bringing fully adequate diets within the reach of all depends upon how earnestly we apply ourselves to the challenge of entering an economy of planned abundance. Success in such an enterprise would enable the many to attain a degree of health and efficiency which only the more fortunate now enjoy.

MINUTES OF THE ANNUAL BUSINESS MEETING

A business meeting of the American Statistical Association was held on Thursday morning, December 28, 1933, at 9:00 A.M. at the Hotel Benjamin Franklin at Philadelphia. The meeting was called to order by Stuart A. Rice, President. The following By-Law, endorsed by the Board of Directors was introduced by the Secretary and was unanimously adopted:

> *By-Law No. 6*—No resolution requesting, advocating, commending, or condemning any section or proposed action, not arising out of the activities of the Association, shall be submitted to the Association for a vote unless the resolution shall first have been approved by the Board of Directors of the Association.

Mr. George H. Van Buren, the representative of the American Statistical Association on the National Conference on Nomenclature of Disease, read a report describing his activities in connection with this conference. His report was accepted.

Dr. Howard W. Green, chairman of the Committee on Census Enumeration Areas, read the report of that Committee. It was accepted as read.

The report of the Committee on Calendar Reform was read by its Secretary, Mr. Meredith N. Stiles. It was received and filed.

The report of the Committee on Fellows was read by the Secretary of the Association. This report was accepted.

The Secretary of the Association also read the report of the representatives of the American Statistical Association on the Social Science Research Council. This report was accepted.

Dr. William L. Crum read the report of the representatives of the American Statistical Association on the Joint Committee on Income Tax Statistics. This report was accepted. Dr. Crum stated that the work of the Committee was now completed and recommended that it be disbanded. A motion was carried adopting his recommendation.

Dr. Neva Deardorff, Chairman of the Committee on Statistics of Relief and Child Care, presented the report of that Committee. It was accepted. Dr. Deardorff requested that the Committee be continued. A motion was carried recommending to the Board of Directors the continuance of this Committee.

Colonel Malcolm C. Rorty, as representative of the American Statistical Association on the Board of the National Bureau of Economic Research, reported the activities of that Bureau. His report was accepted.

The Secretary of the Association read the report submitted by Dr. Robert H. Coats and Dr. Robert M. Woodbury describing the progress of the Encyclopaedia of the Social Sciences.

The Secretary of the Association also read the report by Dr. Ralph G. Hurlin, representative of the American Statistical Association on the Committee Appointed to Advise the New York State Department of Social Welfare. This report was accepted.

The meeting adjourned.

A business meeting of the American Statistical Association was held on Friday morning, December 29, at 9:00 A.M. at the Hotel Benjamin Franklin, Phila-

delphia. The meeting was called to order by the President, Dr. Stuart A. Rice.

The report of the Committee on Statistics of Institutions for Mental and Physical Disorders was presented by its Chairman, Dr. Horatio M. Pollock. The report was accepted.

The report of the Committee on Labor Statistics was read by Miss Mary van Kleeck, the Chairman. It was accepted.

The report of the Committee to Stimulate and Coördinate Research was read by the Chairman of the Committee—Dr. Meredith B. Givens. The report was accepted.

Dr. Givens also read the report of the Committee on Government Statistics and Information Services, this being a Joint Committee with the Social Science Research Council. The report was accepted as read.

Dr. Givens also read the report of the Committee to Advise the Secretary of Labor. This report also was accepted as read.

The report of the delegation of the American Statistical Association on the Joint Committee on the Encyclopaedia of the Social Sciences was read by Miss Mary van Kleeck. The report was accepted.

The Secretary of the Association read the report of the Committee on Special Publications signed by Dr. Frank A. Ross. This report was accepted.

The report of the New York City Program Committee was read by its Chairman, Leon Henderson, and was accepted.

Dr. Donald R. Belcher, as representative of the American Statistical Association on the Business Research Council, reported the progress of that organization. The report was accepted.

The Secretary of the Association read the report of the representative of the American Statistical Association on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing. This report, which was signed by Dr. Walter A. Shewhart, was accepted.

Mr. John L. Sweet, President of the Chicago Chapter, read the report of the Committee on Chapter Relationships, of which he was chairman. It was accepted.

The Secretary of the Association read the report of the Joint Advisory Committee on the Census. This report was accepted.

The Secretary of the Association also read the report of the Committee on Construction and Real Estate Statistics, signed by John R. Riggleman, its chairman. This report was accepted.

The meeting adjourned.

A business meeting of the American Statistical Association was held on Friday, December 29, at 12:30 P.M., at the Hotel Benjamin Franklin in Philadelphia. The President, Dr. Stuart A. Rice, was in the chair.

The following resolutions, endorsed by the Board of Directors of the Association, were introduced by the Secretary of the Association, were put to a vote, and unanimously carried:

RESOLVED that the American Statistical Association in view of the unusual movements of population resulting from the present depression, reaffirms its opinion, expressed by resolution at the Annual Meeting of 1932, of the desirability of a special census of population, to be taken intermediate between the decennial enumerations of 1930 and 1940, in conjunction with the quinquennial census of agriculture in 1934 or 1935. It hereby instructs its officers to bring this opinion to the attention of the proper authorities, and to take all steps available to them, in behalf of the Association, to secure such a census.

RESOLVED that the American Statistical Association views with grave concern the multiplication of state and local projects of the Civil Works Administration which involve primary field enumerations. It calls upon the appropriate state and federal authorities to establish such rules and procedures as will bring about the coördination of these projects. It calls further for the elimination of projects which involve duplicating requests for information in such numbers as to become burdensome to respondents.

The Secretary of the Association read his report for the year. A motion to accept this report was carried.

The Treasurer of the Association read his report. It also was accepted by a vote of the Association.

A motion was carried to accept the report of the Editor of the JOURNAL as communicated to the Secretary.

The following resolution, offered by Dr. Harry Jerome, was unanimously adopted:

RESOLVED that the American Statistical Association expresses its enthusiastic appreciation of the well directed efforts of the Convention Bureau of the Philadelphia Chamber of Commerce to insure the effective functioning of the meetings of the Association and extends to the Bureau and particularly to its director, Mr. Frank L. Devine, sincere thanks for their important contribution to the success of the 1933 Meetings of the American Statistical and allied associations.

The following resolution was offered by Dr. Horatio M. Pollock and was unanimously adopted:

RESOLVED that the American Statistical Association recommend to the Committee on Government Statistics and Information Services that it give particular attention to the development of a national system of statistics of social welfare activities including statistics on crime, delinquency, mental hygiene, feeblemindedness and epilepsy; and to the possibility of establishing in the Federal Government a specific authority for a systematic national collection of such data and for promoting competent state bureaus in the development of such a system.

RESOLVED FURTHER that the American Statistical Association offer to appoint a special committee to advise concerning this proposal, if desired by the Committee on Government Statistics and Information Services.

Dr. Robert E. Chaddock offered the following resolution which was unanimously adopted:

RESOLVED that the American Statistical Association, in Annual Meeting assembled, expresses its profound appreciation to Professor S. H. Patterson, Chairman of the Committee on Local Arrangements, to Mr. H. S. Davis, local representative of our Association, and to their assistants for the comprehensive and adequate provision for our convenience and comfort during these meetings; and to all local agencies for making our stay in Philadelphia agreeable.

The Association records its special obligation to Dr. Viva Boothe for her excellent work, in coöperation with the President, in arranging a truly remarkable program for the Annual Meeting of 1933.

Dr. Frederick C. Mills presented a resolution reading as follows:

> The establishment of the *Annals of Mathematical Statistics* constituted one of the notable developments of the past decade in the advancement of the science of statistics in the United States. This project owes its initiation and prosecution to the enthusiasm and energy of Professor Harry C. Carver. The many valuable contributions to statistical technique which have been made through the pages of this journal are direct fruits of his rare ability and unselfish labors. At this time, when adverse circumstances force a severance of the financial connection between the American Statistical Association and the *Annals of Mathematical Statistics*, it is proper that grateful acknowledgement be made of our heavy indebtedness to Professor Carver. The members of the American Statistical Association, assembled in Annual Meeting, desire to express their admiration and deep appreciation of the services Professor Carver has rendered to the science of statistics, and to the American Statistical Association, in founding and editing the *Annals of Mathematical Statistics*. It is their sincere hope that the future of the *Annals* may be one of high success.

This resolution was unanimously adopted.

The following resolution was adopted:

> RESOLVED that we express to President Stuart A. Rice and to Secretary Willford I. King our appreciation and thanks for arranging and conducting this most interesting and successful annual meeting.

Mr. John L. Sweet offered the following resolution which was unanimously adopted:

> WHEREAS the success of our annual convention has depended not only upon the elaborate series of programs, which we have enjoyed during the past three days, but on adequate and efficient hotel accommodations; and
>
> WHEREAS the visiting delegates to the Philadelphia convention of December 27 to December 29, 1933, desire to publicly acknowledge their indebtedness to those primarily responsible for the success of the convention; therefore, be it
>
> RESOLVED that the Secretary of the American Statistical Association extend thanks to the management of the Benjamin Franklin Hotel—especially to Mr. E. Leslie Sefton and to Mr. Charles L. Todd—for friendly coöperation in arranging the physical facilities for the conduct of our meetings.

Dr. Eugene B. Patton presented the following resolution which was unanimously adopted:

> RESOLVED that the thanks of the Association are tendered to the Philadelphia press for the unusually full and accurate reporting of the activities of the 1933 meetings.

Dr. Irving Fisher presented for the Nominating Committee the following list of candidates:

President: Frederick C. Mills

Directors: (Term to expire December 31, 1936)

Stuart A. Rice

Randolph Burgess

Vice-President:

Collection and Classification of Data and Administration of Statistical Agencies—Isador Lubin

Statistical and Actuarial Methods and Technique, and the Teaching of Statistics—Walter A. Shewhart

Facts and Methods Pertaining to Political Science, Sociology, Social Welfare, Labor Problems, and Vital Statistics—Royal Meeker
Facts and Methods Related to Anthropology, Biometry, Psychology, and Education—Karl J. Holzinger
Facts and Methods Bearing upon Economics and Economic Theory—James Harvey Rogers
Facts and Methods Pertaining Primarily to Business—Bradford B. Smith
Facts and Methods Pertaining to Financial Institutions—Emanuel A. Goldenweiser
Facts and Methods Pertaining to Marketing—Paul H. Nystrom
Secretary and Treasurer: Willford I. King
Editor of the JOURNAL: Frank A. Ross

Dr. Fisher also presented a petition signed by fifteen members of the Association nominating for Vice-President, Professor Harold L. Reed of Cornell University. The President ruled that, inasmuch as candidates are nominated for particular vice-presidencies, the petitioners would have to designate the particular vice-presidency for which they nominated Professor Reed. The nominating committee thereupon nominated him for the field of "Facts and Methods Bearing upon Economics and Economic Theory." A motion was carried instructing the Secretary to cast the unanimous ballot of the members present for all other candidates except the Vice-Presidency covering "Facts and Methods Bearing upon Economics and Economic Theory." Such a ballot was cast by the Secretary and all other candidates were declared elected.

A ballot was then taken upon the candidates for the Vice-Presidency in question. The ballot stood: James Harvey Rogers, 58; Harold L. Reed, 53. James Harvey Rogers was declared elected.

The meeting adjourned.

WILLFORD I. KING, *Secretary*

REPORTS

Report of the Secretary

Membership, December 1, 1932 (including 26 members unable to pay dues but carried on rolls at their request)		1,975	
Additions during 1933		114	
Deductions during 1933:			
Deaths	11		
Resignations	116		
Dropped or suspended for non-payment of dues	313		
		440	
Net loss in membership during 1933			326
Membership, December 1, 1933			1,649
Besides members, we have:			
JOURNAL subscribers, mostly libraries		482	
JOURNAL, domestic exchanges		23	
JOURNAL, foreign exchanges		25	
			530
Subscribers to the ANNALS OF MATHEMATICAL STATISTICS (includes both libraries and regular and honorary members)		219	
ANNALS domestic exchanges		2	
ANNALS foreign exchanges		5	
			226
Total members, subscribers, and exchanges			2,405

The following deaths were recorded during the year:

Professor T. S. Adams	Mr. Hastings H. Hart
Professor William H. Andrews	Mr. Edwin W. Kopf
Dr. E. Delbrück	Dr. T. H. C. Stevenson
Mr. Hugh F. Fox	Mr. William N. Taft
Mr. Edwin Gruhl	Dr. George P. Watkins

Mr. Robert M. Webb

Four numbers of the JOURNAL containing 486 pages, together with the PROCEEDINGS Supplement, containing 239 pages, have been issued in 1933. These compose Volume XXVIII.

There were 7 pages of paid advertising in the four issues of the JOURNAL.

Volume IV of the ANNALS OF MATHEMATICAL STATISTICS was published in 1933 and comprised four numbers containing 342 pages.

The Association published Monograph No. 1, a volume of 133 pages, entitled, AMERICAN AGRICULTURAL VILLAGES: 1930, An Analysis of Census Data, by Irving Lorge under the direction of Edmund deS. Brunner.

Previous to the present Annual Meeting in Philadelphia, Pennsylvania, the Association has held during the year 5 dinner meetings and one symposium in New York City, the average attendance at these meetings being 121.

On November 1st, a reception and dinner was held for the members of the International Statistical Institute meeting in Mexico City while stopping in New York on their return to Europe. There were 226 persons in attendance.

We have reports of meetings held by district organizations as follows:

Chapter	*Number of Meetings*	*Average Attendance*
Albany	4	28
Austin	0	0
Boston	3	22
Chicago	4	46
Cleveland	9	21
Columbus	8	22
Connecticut	4	30
Los Angeles	2	4
Philadelphia	5	34
Pittsburgh	11	40
San Francisco	4	30
Districts		
*Detroit		
Washington	0	0

WILLFORD I. KING, *Secretary*

Report of the Treasurer, Covering the Period December 1, 1932, to November 30, 1933

Gross Receipts and Disbursements

Cash on hand December 1, 1932	$1,052.99	
Gross cash receipts during year	17,132.94	
		$18,185.93
Gross cash disbursements during year		17,656.81
Cash on hand November 30, 1933		$529.12
Gross cash disbursements during year	$17,656.81	
Refunds and adjustments	301.10	
Gross expenses		$17,355.71

* Report not received.

Functional Apportionment of Gross Expenses

(Including Overhead)

Annual meeting and New York meetings	$3,204.15	
JOURNAL and PROCEEDINGS	8,696.38	
ANNALS	2,523.44	
Employment Clearing House	457.74	
Securing new members	434.22	
Miscellaneous	2,039.78	
		$17,355.71

Net Receipts and Disbursements

Cash on hand December 1, 1932		$1,052.99
Gross cash receipts	$17,132.94	
Refunds	820.89	
Net cash receipts during year		16,312.05
Total		$17,365.04
Gross cash disbursements during year	$17,656.81	
Refunds	820.89	
Net cash payments during year		16,835.92
Cash on hand November 30, 1933		$529.12

Itemized Statement of Net Receipts and Disbursements

Cash on hand December 1, 1932		$1,052.99

Net Cash Receipts

Individual membership dues	$7,601.28	
Contributing membership	25.00	
Corporate dues	500.00	
Subscriptions to JOURNAL	2,948.14	
Subscriptions to ANNALS	1,182.52	
JOURNAL sales	212.72	
Advertising	193.00	
Receipts from authors for reprints	259.15	
New York meetings	1,391.25	
Interest on bonds and deposits	514.73	
Sale of Dodge Brothers' Bond	957.10	
Sale of books to members:		
Memorial Volume	$11.69	
Statistics in Social Studies	15.15	
American Agricultural Villages: 1930 (Monograph No. 1)	57.50	

4 Vol.—President's Committee on Social Trends	$285.00		
Miscellaneous books	157.82		
		$527.16	
Total net receipts			$16,312.05
Total			$17,365.04

Net Cash Disbursements

Cost of JOURNAL:			
December, 1932, edition, including reprints.	$984.62		
March, 1933, edition, including reprints	986.56		
PROCEEDINGS, including reprints	1,470.40		
June, 1933, edition, including reprints	1,123.96		
September, 1933, edition, including reprints	905.04		
		$5,470.58	
Cost of ANNALS		$2,200.00	
Printing, postage, and stationery		776.29	
Salaries		6,003.36	
Rent		361.40	
New York meetings		1,315.46	
Telephone and telegraph		89.66	
Annual Meeting		140.59	
Miscellaneous expenses, Editor's office		122.08	
JOURNALS bought back		111.32	
Cost of shipping JOURNALS		2.50	
Books sold to members:			
Statistics in Social Studies	$5.46		
American Agricultural Villages: 1930 (Monograph No. 1)	34.21		
4 Vol.—President's Committee on Social Trends	28.59		
Miscellaneous books	128.81		
		197.07	
Miscellaneous expenses, Secretary's office		45.61	
Total net disbursements			$16,835.92
Cash in checking account, Corn Exchange Bank, November 30, 1933	$100.09		
Cash in Emigrant Industrial Savings Bank	340.32		
Cash and checks on hand, not deposited	88.71		
			529.12
Total			$17,365.04

On November 30, 1933, the Association possessed, in addition to stationery and miscellaneous supplies, the following assets:

Cash on hand	$529.12
Matured dividends receivable	146.75
Furniture carried at	278.86
JOURNALS and PROCEEDINGS, 11,942 copies	
Bonds in Life Membership Fund, market value November 30, 1933, plus accrued interest	1,042.50
Other bonds	3,373.75
Common (guaranteed) and preferred stocks—market value, November 30, 1933	2,137.00

All bills presented to the treasurer have been paid.

WILLFORD I. KING, *Treasurer*

Report of the Auditing Committee

We have examined the books and records in the office of the Treasurer of the American Statistical Association and have verified the bank balances.

We hereby certify that the Treasurer's report submitted is in accordance with the books and records, and, in our opinion, correctly represents the financial condition of the American Statistical Association as of November 30, 1933, and receipts and disbursements during the year December 1, 1932, to November 30, 1933.

DONALD R. BELCHER
ROBERT B. KING
LEON HENDERSON

New York, N. Y.
December, 1933

Report of the Editor of the Journal

During the year 1933 the customary four issues of the JOURNAL have appeared numbering in all 486 pages. Manuscripts submitted this year have been unusually numerous and in the main of high quality. In consequence the task of selection has been difficult. It is our feeling that the issues of 1933 have been of better calibre than ever.

As usual, editorship of the PROCEEDINGS has fallen to the JOURNAL's Editor. Last year's volume of 238 pages contained many highly significant documents.

For several years past the Editor has made every effort to coöperate with our Treasurer in keeping down costs. This year's publication has been well within the budget which last year was materially reduced.

The Editor again wishes to thank publicly Dr. Leo Wolman for his loyal support in conducting the review section in spite of his heavy duties with the federal administration.

He further wishes to testify to his appreciation of the great aid rendered him

by critics whose reviews of submitted manuscripts have played so important a part in the continued improvement of our publication.

Finally, he wishes to convey his thanks to the contributors of articles, notes and reviews who, after all, are the ones who make the JOURNAL possible.

FRANK A. ROSS, *Editor of the* JOURNAL

Report of the Committee on Fellows

The following two names have received the unanimous vote of the members of the Committee on Fellows:

Stuart A. Rice
Henry Schultz

We therefore beg to report that Messrs. Rice and Schultz have been elected Fellows of the American Statistical Association.

SEYMOUR L. ANDREW
WILLIAM L. CRUM
IRVING FISHER
WILLIAM F. OGBURN
EDGAR SYDENSTRICKER, *Chairman*

Report of the Committee on Special Publications

Two manuscripts, unsuited for publication in either our JOURNAL or ANNALS, were referred to this Committee. The first, "Least Squares and Laws of Population Growth," by Edwin B. Wilson and Ruth R. Puffer, though a very valuable statistical contribution, was returned to the author who was able to arrange publication in *Proceedings of the American Academy of Arts and Sciences*, Volume 68, No. 9, August, 1933, pp. 285–382.

The second, *American Agricultural Villages: 1930*, by Irving Lorge (under the direction of Edmund deS. Brunner of the Institute for Social and Religious Research) was accepted by this Committee for publication as Monograph No. 1 of our Association. The arrangements made with the Institute of Social and Religious Research were that the latter, the agency which sponsored the preparation of the document, should deliver to our Association the entire issue bound and ready for distribution free of cost to the Association. Proceeds from sales at the nominal charge determined as the price of the volume are to accrue to our Association to defray costs of handling.

Our Secretary circularized our entire membership list and arranged to have our circulars sent out by the American Economic Association and the American Sociological Society to their constituencies. The American Farm Economic Association ran an advertisement in its Journal.

So far approximately 100 copies have been sold.

HARRY C. CARVER
MEREDITH B. GIVENS
FRANK A. ROSS, *Chairman*

Report of the Committee on Chapter Relationships

After having given careful consideration to the problem assigned to it by President Rice, the Committee on Chapter Relationships makes the following suggestions which it believes may be helpful to the Directors in formulating a plan designed to strengthen the Association and its local elements, and to bring about a closer relationship between local Chapters of the American Statistical Association and the parent organization:

1. We recommend that a committee of one to three persons be appointed by the Board of Directors of the Association to represent the American Statistical Association in each state in which, in the opinion of the Board of Directors, such a committee might render useful service. It shall be the function of each state committee to represent the Association in that state in all matters relating to the compilation and use of statistical data. Each committee would be expected to initiate measures designed to improve the quality of statistical work conducted by municipal, state and federal agencies, or by private organizations, within the boundaries of the state, to coördinate the activities of the local Chapters and of the National Association, and where desirable, to stimulate the creation of new Chapters. Such state committees should submit reports to the Board of Directors once a year, these reports to be in the hands of the Secretary not later than December 1 each year. The work of such committees should be at all times subject to review by the Board of Directors, which Board should have full power over state committees on all questions relating to policy and procedure. It is desirable, in our opinion, that such state committees include persons well acquainted with local problems of governmental administration and of industrial organization.

2. The Committee recommends, furthermore, that the American Statistical Association conduct an active campaign not only to form new Chapters but to induce its members to join a local Chapter if they reside in a city where one already is established. At present, it is estimated that less than half the members who reside in Chapter cities have become affiliated with the local organization. If the remainder were induced to join and to attend meetings, these local bodies would be so strengthened that they could provide better programs and, thereby, attain a prestige which would result in a further gain in local membership. Moreover, the broadened activities, made possible through larger revenues, should bring about an interest that would effect an expansion in membership of the national American Statistical Association itself.

3. Associate memberships present a rather grave problem. With the present large proportion of national members in Chapter cities failing to support the local meetings, most Chapters, to function at all, are compelled to retain many persons on an associate basis. To deprive Chapters of this class of memberships probably would result in rapid disintegration of many bodies already formed. On the other hand, these associate members have no standing in and contribute no revenue to the national American Statistical Association. It is believed they should be placed on a permanent basis with a certain status in the parent organization. Perhaps the best way out of the dilemma is to place certain limitations

on these memberships. A temporary maximum of associate to total memberships in a Chapter might be placed at 50 or 60 per cent. After regular memberships—exclusive of associates—in a Chapter have been increased to 125 persons, the Committee recommends that no more associates be admitted and that those already belonging to the Chapter be required to pay a small fee annually into the national Association. This is one way of extending permanent influence of the American Statistical Association to its local Chapters.

4. To facilitate solicitation of memberships both in the national and in the local organizations, the Committee recommends a periodical exchange of membership lists between each local Chapter and the parent organization.

5. In addition to the foregoing suggestions, the Committee believes the Association can build up strength in local bodies and through them strength in the national organization by rendering assistance in planning programs of individual Chapters. Many of these bodies need more frequent meetings and a greater interest developed in those held. A high standard of programs, made possible through this aid, would tend not only to encourage local Chapters but to create publicity which would react very favorably upon the national Association. The parent organization has greater prestige and is better equipped for making contacts with outstanding speakers than are most Chapters. It is suggested, therefore, that the American Statistical Association conduct a series of programs during the year, under the auspices of the several local Chapters rather than under those of the New York Chapter alone, and that the annual conventions continue to be held under jurisdiction of the national Association but with greater participation from local Chapters.

6. With membership greatly augmented by the foregoing activities, it is believed the Chapters will find one or two dollars of local dues, or of money obtained by some other method—in addition to a dinner charge for each meeting—ample to carry on effective work. When circumstances permit, however, some attention should be given by the national Association to the desirability of its rendering financial assistance to any Chapters in need of such aid.

7. It is suggested that a closer coördination of statistical activities throughout the nation be undertaken by having the local Chapters assist the national Association, wherever possible, in its attempt to further statistical work generally. The Committee, therefore, fully concurs in the recommendations contained in the "Presidential Letter" of Dr. Stuart A. Rice—quoted in the June, 1933, JOURNAL as follows:

> With so much done and with statistical standards so often endangered, would not the Chapters be vitalized if they were to assume the responsibility for defending and developing the statistical work of state and local government? I think so. The long established methods of committee activity developed with the parent association offer sufficient precedence as to procedure, with the added advantage that Committee members would not have to come together from distant points.
>
> If responsibilities of this kind are recognized as belonging to Chapters, which would thus divide the field of responsibility, so to speak, with the parent organization, the argument for further Chapter organization it seems to me to be unanswerable.

JOHN L. SWEET, *Chairman*

Report of the New York City Program Committee

Four meetings of the American Statistical Association were arranged during 1933 by the New York City Program Committee.

The first was a symposium on March 7th at the New School on "Are We Menaced by Machines?" The speakers were Leon Henderson, Le Baron Foster, Bassett Jones, and Meredith B. Givens. Dr. Willford I. King presided. The paper of Bassett Jones was the basis of a book, issued later, entitled *Debt and Production*.

The Committee's best attended meeting was held on April 20th at the Hotel Woodstock. The subject was "Inflation," and the speakers were Ralph West Robey and James Harvey Rogers. Dr. Wesley C. Mitchell presided.

A joint dinner meeting with the Population Association was held May 12th at the Town Hall Club. The topic was "Who Shall Inherit America?" Professor Robert E. Chaddock presided. The speakers were Frank Notestein and Frank H. Hankins.

The last meeting was a discussion of "The NRA and Retail Prices," held at the Roger Smith Restaurant on October 10th. W. W. Cumberland presided. The speakers were Oswald Knauth, Edward Bernays, Paul T. Cherington, and A. W. Zelomek.

The Committee comprised the members of the former up-town and down-town planning committees and included Alfred T. Falk, Stanley B. Hunt, William Murray Kline, Leonard Kuvin, Felix Edgar Wormser, Dean Langmuir, Miss Irene Sheehan, Mrs. Helen Slade, Alan H. Temple, Dr. Woodlief Thomas and Mr. Robert B. Warren.

LEON HENDERSON, *Chairman*

Report of the Committee to Stimulate and Coördinate Research

Further progress has been made during the year in attaining better balance, closer articulation and clearance in the work of the various committees of the Association concerned with the development of statistical data and research. Of the research committees all but two have been active and productive. During the current year it is hoped that new work may be initiated in fields not now actively cultivated by the Association.

The outstanding development of the year was the creation of the Committee on Government Statistics and Information Services, jointly appointed by the American Statistical Association and the Social Science Research Council. This Committee, with its affiliate, the Advisory Committee to the Secretary of Labor, has maintained an active staff in Washington since June, and has drawn heavily upon the previous work of the Association's Committee. The fields of price statistics and of public health and vital statistics have been referred, for the time being, to the Committee on Government Statistics, while the Advisory Committee to the Secretary of Labor assumes general responsibility for the field of labor statistics following the long record of service of the Association's recent standing Committee in this field.

A subcommittee in statistical theory and method, consisting of Harold

Hotelling, Henry L. Rietz, Walter Shewhart, Edwin B. Wilson and Burton H. Camp (Chairman), will report to your general Committee in February, with recommendations regarding the more effective furtherance of the Association's activity in the field of technique and methodology.

A principal concern of your Committee during the coming year will be the formulation of plans for actively following up the work in Washington which has been conducted by the Committee on Government Statistics and Information Services, after the present resources of that Committee shall be exhausted on June 30th next. It is hoped that the new Central Statistical Board will be able to carry forward much of the work initiated by the Committee on Government Statistics, but the very existence of that Board provides a new channel for useful contact on the part of the Association with the statistical services of the Federal Government.

MEREDITH B. GIVENS, *Chairman*

Interim Report of the Committee on Government Statistics and Information Services

Jointly Sponsored by the American Statistical Association and the Social Science Research Council

Only a brief interim report of progress is submitted at this time by the Committee on Government Statistics and Information Services. A final report will be prepared in midsummer, meanwhile the pressure of current work makes it impossible for the Washington staff to prepare a general report. The origin and organization of the Committee was described in this JOURNAL for September, 1933, pp. 333–4. Since that time the outstanding development has been the establishment of the Central Statistical Board, which includes a representative of the Committee on Government Statistics and Information Services. (See JOURNAL, December, 1933, p. 438.)

A major development in the Committee's current work has been an invitation to coöperate with the Central Statistical Board in an intensive survey and appraisal of the work of the Bureau of the Census in the field of manufactures, agriculture and population. The Committee has accepted the invitation with the understanding that the attention of its staff will be concentrated upon the Census of Manufactures. General recommendations concerning the Census of Agriculture and the Census of Population will be made upon the basis of a more limited investigation than in the case of the Census of Manufactures.

The final report from the Committee after the expected termination of its work in June, 1934, will present to the several Departments and to the Central Statistical Board, as well as to the statistical fraternity, a rounded consideration of the major problems of planning and organization of the statistical work of the Federal Government. Meanwhile, the work of the staff is focused upon the accomplishment of immediate improvements in organization and procedure. The Committee is bending every effort to reinforce the work of the Central Statistical Board, in the hope that this new organization will become a permanent and influential centralizing influence in the elevation of standards and in the

long-range planning of statistical activities. The emergence of the new administrative agencies in Washington, many with divisions dealing with statistics or engaged in research activities, has added complications in the organization of the Federal statistical services. The relationship between these new administrative agencies and the permanent fact-finding agencies is a matter which engages the particular attention of the Central Statistical Board, and of the Committee and its staff.

The personnel of the Committee's resident staff at present (February) is as follows:

Henry B. Arthur, formerly member of the staff of the Harvard Economic Society, and chief of the Price Section, Division of Research and Statistics, NRA

Murray R. Benedict, Professor of Agricultural Economics, Giannini Foundation, University of California, Berkeley

Edward H. Chamberlin, Assistant Professor of Economics, Harvard University

Ewan Clague, Director of Research, Community Council of Philadelphia

Miss Florence M. Clark, formerly associated with profit studies conducted by the National Bureau of Economic Research

Morris A. Copeland, Professor of Economics, University of Michigan

J. Frederic Dewhurst (part time), Twentieth Century Fund, New York

Ralph C. Epstein, Professor of Economics, University of Buffalo

Miss Margaret H. Hogg, Russell Sage Foundation, New York

Jacob Perlman, formerly Assistant Professor of Economics and Statistics, University of North Dakota

Lowell J. Reed (part time), School of Hygiene and Public Health, Johns Hopkins University

Ralph J. Watkins, Director, Bureau of Business Research, University of Pittsburgh

The Committee's work in the field of labor statistics is described below by the report of the affiliated Advisory Committee to the Secretary of Labor. At the time of the present writing it is expected that additional staff will be secured to provide for work in fields not yet covered by the Committee.

MEREDITH B. GIVENS, *Executive Secretary*

Interim Report of the Advisory Committee to the Secretary of Labor

Affiliated with the Committee on Government Statistics and Information Services

In the field of labor statistics the work of the Committee on Government Statistics has been conducted through the Advisory Committee to the Secretary of Labor to which staff assistance has been furnished by the central Committee. The organization of the Advisory Committee was described in this JOURNAL for September, 1933, p. 350. Since that time additional members have been added to the Committee's staff in Washington and new subjects have been taken up.

The Committee first gave its attention to the Bureau of Labor Statistics *indexes of employment and payrolls*, both in manufacturing and in non-manufacturing industries. As a result of recommendations contained in a series of memoranda analyzing the Bureau's methods, prepared by Miss Aryness Joy, the BLS has already made important changes. Notably, a new base (1925–1927 average) has been selected, and the revised index will be published shortly. The Committee has assisted in the development of a CWA project for extending the number of reporting firms in non-manufacturing industries in all states.

At the request of the Secretary the Committee has given special attention to the BLS *cost-of-living index*. A detailed report was prepared outlining the methods used in computing the index, and Miss Margaret H. Hogg is now giving attention to their revision. The Committee provided assistance in planning and administering the cost-of-living survey of Government employees in the city of Washington, incidental to determining whether their salary reduction would be restored. Recommendations concerning the character of future budget surveys were made in a series of memoranda prepared by Miss Helen Wright. A report on the work in this field was made at the meetings of the American Statistical Association in Philadelphia in December, 1933, and the papers prepared for those meetings appear in the PROCEEDINGS.

Closely connected with the cost-of-living work is the subject of *retail prices*. The Committee assisted in preparing a detailed set of specifications for retail price reporting, and the trial survey made in Washington in November, 1933, was directed by Professor John H. Cover of the Committee's staff. A CWA project for the trial of retail price reporting specifications in four other cities is now under way. More recently the Committee has given attention to the computation of the index numbers and the improvement of methods used by the Bureau in handling its price reports. Specifications for wholesale price reporting have been developed and a study of the weighting used in these indexes has been initiated by Mr. Henry B. Arthur.

For some time past, the Bureau has recognized the need for improvements in its *reports on wages, hours and working conditions*, and recent developments in the NRA have further complicated the problem. At the suggestion of the Committee the Bureau deferred all field work awaiting recommendations as to further work in this subject. The Committee recommended an experimental study in an industry not previously canvassed and of interest in connection with the recovery program. Such an opportunity was presented by the Petroleum Administrative Board's survey of wages and hours in the producing, refining and retailing branches of the petroleum industry, to which the Committee is lending planning assistance.

Efforts are being made to lay the foundation for improved *statistics of unemployment*. The Committee participated in the planning of a CWA project for a trial census of unemployment in three selected cities, testing different schedules and related problems of sampling. The Committee has also worked on the problems of making the current employment data more readily usable in estimating unemployment, and to the classification of labor supply, particularly as it relates to applicants at the U. S. employment offices. In coöperation with

the Committee on Government Statistics and Information Services the entire subject of *industrial and occupational classification* is being examined.

A memorandum suggesting improvements in the compilation of *statistics of industrial disputes* has been submitted. Subjects in the field of employer-employee relationships to which the staff is giving consideration include union wage rates and hours of labor, trade union membership, trade agreements. Other phases of this field to which the two affiliated Committees will give attention include (1) labor turnover, (2) accident statistics, (3) absenteeism, (4) immigration, (5) social statistics, (6) measurement of productivity, (7) measurement of labor income in the United States, (8) statistics relating to unemployment, and (9) foreign labor statistics.

Members of the Committee and of the staff of the Committee on Government Statistics and Information Services who have been engaged in the basic research for the Advisory Committee include Misses Margaret H. Hogg, Aryness Joy, Margaret C. Klem, Edna Lonigan, and Helen Wright, and Messrs. Henry B. Arthur, Ewan Clague, Morris A. Copeland, Meredith B. Givens, Murray W. Latimer, Jacob Perlman, and Sidney W. Wilcox. In January Mr. Wilcox will leave the Committee's staff to become chief statistician of the Bureau of Labor Statistics.

EWAN CLAGUE, *Secretary*

Report of the Committee on Labor Statistics

As a group the Committee on Labor Statistics has been inactive during 1933 since the membership of the Advisory Committee to the Secretary of Labor was largely recruited from the membership of the Committee on Labor Statistics. However, the Committee on Labor Statistics held a successful annual meeting in Philadelphia on December 26 at which the principal developments in labor statistics in 1933 were discussed. The following topics were presented:

1. *Employment and Payrolls*—by Miss Aryness Joy. Miss Joy outlined the work of the Advisory Committee to the Secretary of Labor in revising the indexes of manufacturing, employment and payrolls of the Bureau of Labor Statistics, a development that was well under way when the Advisory Committee was appointed. A number of memoranda had been presented to the Secretary of Labor on the subject together with certain informal memoranda to the Commissioner of Labor Statistics and to members of the Bureau staff. Many of the suggestions had already been accepted and additional suggestions would be made in the next few months. Miss Joy outlined the CWA project now under way which is designed to increase the number of nonmanufacturing firms reporting to the state departments of labor and the Bureau of Labor Statistics.

2. *Measures of Unemployment*—by Miss Margaret Hogg. Miss Hogg outlined the methods used in the measurement of unemployment in New Haven. The experience with the surveys in that city had suggested that it would be advisable to sacrifice information on duration for the sake of better data on other points and to break down layoffs into their different types. There was general agreement that the census and survey methods might be justified in terms of

their value as bench marks to which current employment statistics and data on the number of persons seeking work could be related.

3. *Public Employment Office Statistics*—by Bryce M. Stewart. Mr. Stewart reported that the Labor Committee's principle of daily reports of transactions rather than periodic statistical reports from local employment offices had been adopted by the United States Employment Service, that this procedure was being applied to the National Re-Employment Service and was being installed in its offices throughout the country with the aid of a CWA project. There was a lengthy discussion of the need of industrial and occupational classifications for employment office statistics.

4. *Cost of Living and Retail Prices*—by Ewan Clague. Mr. Clague reported on the cost-of-living survey conducted by the Advisory Committee to the Secretary of Labor in Washington. Under this survey in which the Bureau of Labor Statistics and the Bureau of Home Economics had coöperated, studies had been completed of food, rents and clothing. Recommendations had been made to the Secretary of Labor. The Committee had also been coöperating with the Central Statistical Board in the working out of cost-of-living indexes. Attention had been given to such matters as weighting of the various items and new specifications for price reports. A CWA project had been set up for a simultaneous survey in some three hundred communities, which would help to build up the price reports of the Bureau of Labor Statistics.

5. *Wages*—by Charles Baldwin. Mr. Baldwin reported that the Bureau of Labor Statistics had done more work on wage data in the first six months of 1933 than ever before. New industries such as the aeroplane industry had been worked on and a good deal had also been done on wages and hours in piece work and contract industries. In the last six months it has been necessary for the Bureau to give its attention to immediate needs, such as the furnishing of information for the NRA.

6. *Work of the Central Statistical Board*—by Meredith B. Givens. Mr. Givens reported on the establishment and composition of the Central Statistical Board. The Board had given attention to retail prices, made proposals on new work such as construction statistics and had considered various measures for the development of standards and of coöperation between the different federal bureaus.

7. *Coöperation in Labor Statistics Between Trade Associations and Governmental Agencies*—by J. Frederic Dewhurst. Mr. Dewhurst outlined the coöperative methods in statistical reporting being developed by certain trade associations and the federal statistical bureaus, such as the Census and the Bureau of Labor Statistics. Different points of view had been expressed, mainly, that trade associations should do all the collection, that the government should do it all, that a division between the government and trade associations should be devised. The important consideration was to combine in one report information for the Census, the Bureau of Labor Statistics and the Code Authority, and this involved questions of jurisdiction between the Bureau of Labor Statistics and the Census, a problem that had been met thus far by requiring a report for each of these Bureaus.

There was considerable discussion concerning the future of the Committee in

view of the appointment and activities of the Advisory Committee to the Secretary of Labor. There was some feeling that during the existence of the Advisory Committee, the Committee on Labor Statistics should suspend its activities and leave the field clear for the better financed and better staffed Committee. President Rice of the Statistical Association was convinced that the Committee on Labor Statistics had a very real function, and it was emphasized that the Committee was performing useful work in bringing together producers and consumers of labor statistics from federal, state and unofficial organizations to discuss their problems.

After the annual meeting the Chairman of the Committee on Labor Statistics requested the Board of Directors of the Statistical Association to discontinue the Committee for the time being, and the Directors passed the following resolution:

> At the request of the Chairman of the Committee on Labor Statistics, the Board of Directors of the Association is discontinuing this Committee, at least temporarily, and for the present, transferring its duties to the Advisory Committee to the Secretary of Labor. It is the unanimous opinion of the Board that the achievements of the Committee on Labor Statistics have been of a high order of excellence and that the Committee has rendered services extremely valuable to the states, to the Nation, and to the statistical fraternity. The Board, therefore, takes this occasion to thank each member of the Committee for his or her part in this good work.

Charles E. Baldwin	Paul H. Douglas	Howard B. Myers
Joseph A. Becker	C. A. Fried	Eugene B. Patton
William A. Berridge	Corrington Gill	Roswell F. Phelps
Louis Bloch	Meredith B. Givens	Casimir A. Sienkiewicz
R. D. Cahn	Ralph G. Hurlin	F. G. Tryon
R. H. Coats	Don D. Lescohier	Ralph J. Watkins
W. J. Couper	Liefur Magnusson	Sidney W. Wilcox
J. Frederic Dewhurst	William J. Maguire	

Mary van Kleeck, *Chairman*
Bryce M. Stewart, *Executive Secretary*

Report of the Committee on Income Tax Statistics

Joint with the American Economic Association and the American Association of University Instructors in Accounting

Following the annual meetings of December, 1932, at which the three delegations to the Joint Committee submitted the 1932 report of the said Committee, the three Associations authorized the continuance of our work during the year 1933, and each Association nominated the same delegations as for 1932. Early in the year 1933, Professor King carried on correspondence with the members of the full Joint Committee relative to procedure in bringing the recommendations worked out in 1932 into final form and taking them up with the Treasury Department. It was agreed as a result of this correspondence that further work should be in charge of a Subcommittee consisting of Professors Ebersole, Greer, and Crum (chairman).

The Subcommittee, after a preliminary correspondence, arranged for a meeting at Washington to go over the various recommendations with agents of the Federal Treasury. The meeting was attended by Professors Greer and Crum on behalf of the Joint Committee and by Mr. Stark and Mr. White and other representatives of the two most interested agencies in the Treasury, namely, the Section of Financial and Economic Research and the Statistical Section of the Bureau of Internal Revenue.

In view of the inability to take up at the initial conference matters relating to the individual returns, the Subcommittee arranged to have Mr. Kuznets, who was nominated as an alternate by Professor Ebersole, to call upon the Treasury officials and discuss this aspect of our work. This conference of Mr. Kuznets took place on May 23, 1933.

Subsequent to the two conferences, the members of the Subcommittee were circularized as to their opinions on the proposals which Treasury officials seemed in a position to put into effect, and the decisions of the Subcommittee relative thereto have been brought to the attention of Dr. Susan S. Burr, of the Treasury.

Although it is apparent that further matters connected with the income tax statistics could helpfully be studied by the Joint Committee, it is the feeling of the Subcommittee that the existence of the Committee on Government Statistics and Information Services at Washington warrants the suspension, at least for the present, of the activities of our Joint Committee. The Subcommittee therefore recommends to the Joint Committee and through the delegations thereof to the three Associations that the work of the Joint Committee be regarded as now completed and that the Joint Committee be discharged at the end of this year.

W. L. Crum, *Chairman*

Report of the Committee on Real Estate and Construction Statistics

The Real Estate and Construction Statistics Committee has continued to coöperate with the United States Department of Commerce, the National Recovery Administration, and other organizations, in the work of improving statistical methods, data, and application in the fields of real estate and construction. Work was continued relative to standardizing classifications of residential structures for use in vacancy and similar surveys. Through the results of this work, assistance was given in the making of preparations for the real property inventory now being conducted by the Bureau of the Census. Work on the directory of construction statistics has been delayed somewhat due to pressure of other duties. The Committee has under way plans for assisting in the analysis of the problem of recovery in the construction industry.

John R. Riggleman, *Chairman*

Report of the Committee on Statistics for Mental and Physical Disorders

During the current year your Committee has been able to meet but once, on September 29. Due to the general realignment of committee work as authorized by the Association at the last meeting, several of the projects formerly under the Committee's consideration were transferred to the Committee on

Statistics of Relief and Child Care, and the Committee on Statistics of Delinquents and Criminals. Reports on these projects will accordingly be made by those now concerned.

Two projects have engaged the Committee's attention during the past year, namely, (1) the preparation of a hospital discharge schedule and a demonstration of its use under the supervision of the New York State Department of Social Welfare, and (2) the general improvement of hospital records through the development of uniform statistical practice. The Committee on Statistics of the American Hospital Association is coöperating with your Committee in this work.

With respect to the first of these projects, officials of the New York State Department of Social Welfare, though approving the discharge schedule recommended by the Committee, decided that no official action could be taken by the Department to secure its general use by the hospitals of New York State. Voluntary acceptance of the schedule by certain hospitals was, therefore, sought by the Committee through the coöperation of the New York State Hospital Association. The authorities of the Memorial Hospital in Albany and the Vassar Brothers Hospital at Poughkeepsie have approved the use of the schedule in their institutions and for the present no extension of its use to other hospitals will be attempted. The Committee plans, however, as soon as adequate trial has been made in the two hospitals above mentioned, to extend the use of the schedule as rapidly as possible to other hospitals in New York State and has arranged to coöperate to this end with a special committee appointed by the American Hospital Association to consider the whole problem of hospital records. A joint meeting of your Committee and the Committee of such Association will be held at an early date in 1934.

The hospital discharge schedule above referred to is a single sheet covering the usual identification data regarding the patient; his financial status as indicated by his classification as a pay, part pay, public charge, or free patient; the hospital diagnosis; operations performed; duration of stay in hospital; condition on discharge; and other incidental facts of social significance. It is designed to provide the basis for a statistical interpretation of the social and economic status of hospital patients and of the results of hospital care. These statistics if properly collated, will, the Committee believes, contribute much to a better public understanding of many of the problems of hospital medical care and, at the same time, will furnish the hospitals themselves with an adequate check on the results of their work.

The second project mentioned, namely, the standardization of hospital statistical procedures generally, will likewise have to be carried on first as a demonstration in a few selected hospitals. Because of the considerable variation among hospitals in the character and scope of statistical information gathered, adequate analysis and interpretation of statistical compilations covering both state and national fields are well nigh impossible. The problem before the Committee is that of drawing up schedules of hospital statistics which can be applied uniformly to hospitals of comparable type, conducting a demonstration of the use of such schedules in selected hospitals, and finally the preparing of a simple manual of

uniform statistical practice for hospital use. Contingent upon satisfactory demonstration of the statistical schedules, the coöperation of the American Hospital Association in extending the use of such schedules is assured.

Your Committee wishes to call particular attention to the publication by the Commonwealth Fund during the past year of a New Classified Nomenclature of Disease which has been in preparation by authorities in the various fields of medicine during the past three years. This classification which represents a new departure in the classification and nomenclature of disease is based both on the etiology and site of disease. It is now on trial in several hospitals but an international agreement prevents its adoption at this time by the Bureau of the Census and state departments of health. Unquestionably, it represents a decided improvement in medical nomenclature and will undoubtedly prove of great value in medical research. Whether or not it can be utilized as satisfactorily as the present international system of classification for statistical summation of health data, is a question which cannot be answered from present experience.

Continued improvement is being made in the statistical practice of hospitals for mental diseases and institutions for mental defectives. The great majority of such institutions throughout the country has approved and is using uniform statistical standards. A revised statistical manual was adopted by the American Association on Mental Deficiency during the present year, and the Committee on Statistics of the American Psychiatric Association is now preparing a new classification of mental disorders which will require many changes in the statistical system now generally in use in hospitals for mental diseases. Members of your Committee have been in close coöperation with these associations during the past year and have assisted in the development of the improved procedures recommended.

The Census Bureau is now engaged in taking its decennial census of institutions. This census will relate to the movement of population during 1933, and to the resident population on January 1, 1934. It will cover both public and private institutions caring for the insane, mental defectives and epileptics. Owing to the necessity of limiting expenditure of the Census Bureau, the scope of this census is less comprehensive than that of 1923, and the Bureau is obliged to rely upon the voluntary coöperation of the institutions in securing its data, in place of employing a representative of each institution to fill out the schedules as was done in 1923. The Committee expresses its doubt that the present census thus taken on a voluntary basis will prove as complete and otherwise satisfactory as that of 1923.

Your Committee wishes particularly to urge that state departments concerned with the administration of institutions for the insane, mental defectives and epileptics coöperate more closely with the Census Bureau. It should be possible for state departments to gather readily from the individual institutions the information desired by the Bureau. Such an arrangement would save time and money for all concerned and would, it is believed, result in much more competent statistics. State authorities are in a great deal better position to gather statistics of these institutions than is the Census Bureau.

The desirability of more prompt publication of statistical reports relating to institutions should be mentioned. Through delay in publication long after the statistical events, much of the value of these reports is lost. Unquestionably, this work would be speeded up if the arrangement suggested above with state institutional authorities could be made effective. The handicaps to the Census Bureau which result from the present practice of attempting to gather uniform statistics from individual institutional authorities, warrant in the opinion of your Committee, an endorsement by the Association of the plan here recommended for closer coöperation on the part of state authorities with the Census Bureau.

FREDERICK W. BROWN	C. LUTHER FRY
KATE E. CLAGHORN	DAVID M. SCHNEIDER
NEIL A. DAYTON	HORATIO M. POLLOCK, *Chairman*
EMIL FRANKEL	CARL E. MCCOMBS, *Secretary*

Report of the Representative on the National Conference on Nomenclature of Disease

The purposes of the National Conference in preparing "A Standard Classified Nomenclature of Disease" were: (1) to establish standard definitions of disease; (2) so to define diseases as to prevent overlapping titles and to exclude symptoms from diagnostic Nomenclature; (3) to establish uniformity of Nomenclature throughout this country.

A preliminary edition was published in April, 1932. Following advice and criticism received from individuals, hospitals and other medical institutions, the official edition was published in January, 1933.

It has been necessary constantly to consult hospitals, committees appointed by affiliated national organizations, and individual authorities regarding improvements in the Nomenclature. The Executive Secretary of the Conference, Dr. H. B. Logie, has held frequent personal consultations with hospital staffs and individual staff physicians in order to assist in the establishment of the Nomenclature in hospitals. He has given personal instruction to record clerks and has conducted an extensive correspondence with all concerned in the use of the Nomenclature. As a result of this work, during the eleven months since the publication of the official edition, the Nomenclature is now known to be established in 88 hospitals in the United States and in two in Canada. It has found its way into 272 other hospitals, in some of which it may be in use without our knowledge. The publishers advise that the official edition is already nearly three-quarters exhausted and that a reprinting will soon be necessary. The adoption of the Nomenclature has been about twice as rapid as we anticipated.

The medical schools of Harvard, Yale, Columbia, University of Pennsylvania, Washington Reserve, University of Chicago, University of Indiana, Tulane University, Stanford University, George Washington University, Vanderbilt University and the University of Nebraska have installed the Nomenclature in associated hospitals. In addition, the Nomenclature has found its way into every state with five exceptions, as well as into the following foreign countries:

Sweden, Spain, Russia, Palestine, Syria, China, South Africa, East Indies and New Zealand.

It is hoped that a way will be found to carry on the work of the National Conference indefinitely, although it is not apparent, at this writing, as to how this can be financed. The work should go on for the following reasons. (1) Since hospital statistics on morbidity and mortality are confused by the ambiguous and overlapping terms in common use, the introduction of exact methods requires supervision and instruction. It is necessary that a constant influence be exerted on hospitals and physicians if the standard is to be maintained which accurate and useful statistics demand. (2) Since it will be some years before the Nomenclature becomes a standard, there must be a directing agency to instruct new hospitals in the purposes and use of the Nomenclature. (3) Since Medicine is progressing and changing, it is necessary to maintain a center, charged with the authority of the national societies, to coördinate and pass on to hospitals the changes in diagnostic conceptions as these affect diagnostic terms. (4) The next official edition should be prepared and edited preferably under the same direction as the present edition.

The officers of the National Conference on Nomenclature of Disease are Haven Emerson, M.D., President; Henry A. Christian, M.D., Vice-President and E. H. L. Corwin, Ph.D., Secretary. There is an Executive Committee of 15 under the Chairmanship of George Baehr, M.D., with H. B. Logie, M.D., Executive Secretary. Your representative has served as a member of this Executive Committee since its formation. The valuable counsel, with respect to tabulation technique, of Mr. M. L. Goldstein, of the Metropolitan Life Insurance Company, has been of great assistance to the Executive Committee. The American Statistical Association should continue to have a representative on the National Conference and this is recommended.

GEORGE H. VAN BUREN

Report of the Committee on Statistics of Relief and Child Care

Pursuant to the understandings reached at the last annual meeting of the Association, the old committees on Institutional Statistics and on Dependency and Child Welfare were superseded by three committees; one on Statistics of Institutions Caring for Persons with Mental and Physical Disorders, one on the Statistics of Delinquents and Criminals and one on the Statistics of Relief and Child Care. This latter committee is now composed of the following persons: F. Stuart Chapin, Ewan Clague, Emil Frankel, Ralph G. Hurlin, Maurice J. Karpf, Philip Klein, Frederick F. Stephan, Maude E. Stearns, Emma A. Winslow, Helen Witmer and the Chairman.

On February 20, 1933, the Committee met and decided upon a program for the year and for a longer period, if continued by the Association. The whole Committee has met four times during the year and there have been very frequent meetings of subcommittees. The work schedule has centered this year in the development of better statistical material in the field of child care, that is,

social measures designed both to aid families in the care of their children at home, and to care for children away from their families.

One of our members, Dr. Ralph G. Hurlin, is also the Chairman of the State Advisory Committee on the Demonstration Project in Social Statistics of the New York State Department of Social Welfare. In this capacity he engineered, in the best sense, a formal request to our Committee to review the whole system of reporting on children in foster care, for the operation of which the New York State Department is fully equipped with legal powers now enforced, and to advise regarding a complete system of records and reports. In response to that request a subcommittee was created and work began at once and continued through the spring and summer. The tentative draft of this committee's report on "The Collection and Tabulation of Statistical Information on Children in Foster Care," a document of some 88 pages, was forwarded to Dr. Hurlin's State Advisory Committee in the early autumn and was accepted by that Committee some weeks later. Since its completion in tentative draft this report has been distributed to interested persons and organizations throughout the country for criticism and comments. These persons and organizations have sent many helpful replies. These are being reviewed by the Committee and will be used in the final revision of the manuscript.

Pending the publication of this document, it may be in order to report to the Association, that this Committee has undertaken first to lay out a picture of the statistical information that the state should regularly publish about children in foster care. It has then described what it considers the simplest and most trustworthy tools and methods by which that information can be gathered and tabulated. Standard tables in skeleton form have been devised as a means of seeing exactly how items of information collected, would be used and how correlated. Report forms have been set up by which the agencies and institutions are to report (1) on individual children recieved for, and discharged from the agency's care, (2) on the monthly movement of population and (3) annually, on finance and service statistics.

Your Committee believes that, while it is probable that New York State, on account of the unusually stringent requirements for reporting put upon agencies, does not now furnish a laboratory setting for an experiment of immediate application in more than a few states, it does provide a situation in which an experiment that will challenge other states can be made. The Committee has sought to fully utilize that opportunity. The Committee is prepared to correspond with chapters that are interested in this problem.

The second rather large project on which the Committee has embarked this year is the development of an appraisal form or method by which a community could score its total resources and performance in the field of child care. This is under the guidance of a subcommittee of which Maurice J. Karpf is Chairman.

In both of these enterprises the State Department of Social Welfare, Division of Research, has been generous in providing the Committee with staff and clerical service and in giving all forms of needed coöperation.

The Committee has kept closely in touch with the plans for the forthcoming federal census of children in the care of institutions and agencies by the U. S.

Census Bureau. Early in the spring the Committee urged that instead of seeking data tabulated by the agencies, the method hitherto employed, the census should consist of a genuine enumeration of the children under care on a given day. After due consideration the Census Bureau adopted the enumeration plan.

Through Dr. Winslow's membership in the Committee, it follows currently the appropriate activities of the U. S. Children's Bureau.

The Committee has watched with deep interest the rapid development of the statistical service of the Federal Emergency Relief Administration and the continuation of the longer series of relief data of the U. S. Children's Bureau which covers all types of relief in 120 cities, and in 43 of these cities correlates these data with those in other forms of social and health service. The Committee expects, if continued during the coming year, to devote considerable attention to an analysis and evaluation of the relief figures now being compiled by the several authorities and agencies in the field.

Beside these direct measures for the improvement of methods in the field of its interest, the Committee's members entered into a friendly conspiracy to use their individual and collective influence to secure discussion by competent statisticians of papers dealing with statistics of relief and child care at such gatherings as the National Conference of Social Work and similar bodies. It is hoped thereby to promote more thoughtful and careful work and to cultivate greater appreciation of good work.

Your Committee on the Statistics of Relief and Child Care asks to be continued during the coming year.

NEVA R. DEARDORFF, *Chairman*

Report of the Committee on Calendar Reform

MAJORITY REPORT

Formation of Committee.—The question of calendar reform has been before the public for some years and has been considered of sufficient importance to be discussed in international conference by official representatives of governments including the United States. The manifestations of favorable opinion in the matter, in this country and abroad, have the character of a substantial movement.

In any case, the serious steps that have been taken in this direction and continued manifestations of interest in responsible circles, led the executives of this Association to consider whether calendar reform was not a question in which the Association should take an immediate interest and upon which it should voice an opinion. For this interest there existed the particular reason that one of the principal arguments advanced for calendar reform and supported by many statisticians is that it would simplify the compilation and analysis of periodic statistical information and remove a cause of erroneous interpretation to which such information is liable. On behalf of a special committee appointed to consider the matter, Mr. Seymour L. Andrew recommended to the Board of Directors the creation of a Standing Committee on Calendar Reform.

This Standing Committee was therefore appointed to make a study of this subject and report. Its members were selected with a view to making it as representative as possible of the different fields of statistics, that is to say, broadly, economic and scientific, and more particularly, the statistical activities of industry, finance, transportation, public utilities, management engineering, public health, meteorology and of the government. It is composed of the following members of the Association:

Chairman, M. B. Folsom, Assistant Treasurer, Eastman Kodak Company, Rochester, N. Y.

Dr. C. F. Marvin, Chief of the Weather Bureau, Department of Agriculture, Washington, D. C.

S. L. Andrew, Chief Statistician, American Telephone and Telegraph Company, New York City.

Dr. E. Dana Durand, Chief Economist, U. S. Tariff Commission, Washington, D. C.

Professor H. S. Carter, Wharton School of Finance and Commerce, University of Pennsylvania, Philadelphia, Pa.

Dr. A. H. Hedrich, School of Hygiene and Public Health, The Johns Hopkins University, Baltimore, Md.

Dr. Julius Parmelee, Director, Bureau of Railway Economics, Washington, D. C.

W. J. Donald, Executive Vice-President, Packaging Machinery Manufacturers Institute, 52 Wall Street, New York City.

R. P. Towne, Auditor, National Blank Book Company, Holyoke, Mass.

Ernest A. Tupper, Acting Chief, Division of Economic Research, Bureau of Foreign and Domestic Commerce, Washington, D. C.

The Committee immediately recognized that the statistical aspects of calendar reform are closely related to its general economic and social aspects. It felt it was important to emphasize the vital relation of periodic statistical information to the economic and social welfare and that if difficulties in analysis and liability to misinterpretation can be removed by a simplification of the calendar, general good will unquestionably result. It recognized, too, that difficulties other than those of statistical nature are met in the social and civil uses of the calendar, the removal of which would also be beneficial. While it takes but little study to discover that all these difficulties can be almost wholly removed by simple forms of revision, the Committee did not fail to consider that the disturbance and cost of change must be faced; also that sentiment and tradition are involved as well as certain religious feelings. It felt, therefore, that it was necessary to evaluate all these aspects of the question, but primarily from the standpoint of the greatest permanent good to the greatest number. Will the simplification of the calendar confer lasting benefit upon humanity as a whole?

The Committee believes that it is indeed in the interest of the Association, and in the public interest to voice an opinion both upon the question of changing the calendar and upon the changes that should be made.

The Committee held two meetings in Washington, one with full attendance and

the other with an attendance of six, and the members also exchanged correspondence. At the outset of its formation the opinion prevailed that it should approach the subject wholly in the scientific spirit. Without failing to examine as far as possible the valuable and extensively distributed information on calendar reform that has been published by the League of Nations, by National Committees on Calendar Reform in different countries, by various institutions, in the press, and by different groups of advocates, the Committee felt that it should endeavor to reach entirely independent conclusions derived from the knowledge and experience of the members in their respective fields of statistical activity and upon which it was hoped they could all agree.

The Evolution of the Calendar.—A calendar is a device introduced by man during the very earliest ages of his development to enable him to time and date the important events of his occupation and lifetime; to determine the recurrent events of planting, hunting, fishing, etc., including in the course of time, the incidents of tribal and national history and the whole structure of chronology of the past. It also was used to keep account of his commercial transactions, and ultimately for statistical measurement of his economic, social and scientific progress.

In its formation he very naturally strove to utilize certain obvious and definite time intervals nature herself supplies, namely, the solar day, the lunar month and the solar year. In the course of time he added to these natural units one of his own, namely, the seven-day week, six days of work and a seventh of rest, recreation and worship. These elements of calendar make-up, the day, the seven-day week, the month comprising variously 28, 29, 30 and 31 days, and the solar year embracing its seasons, have come down to us today from the most ancient times. The calendar now in practically universal use throughout the world had its origin at the time of or before the very founding of Rome itself. After a number of relatively major changes it was given very nearly its present general form by Julius Caesar.

In bringing this calendar to its present stage man has been continuously mystified, baffled, and his efforts made to face repeated failure because of the incommensurate relationship between the time intervals of the day, the lunar month, and the solar year. For many centuries these relationships were not only inadequately known but plan after plan for a simple public calendar such that the calendar year would keep faithfully in step with the march of the seasons, that is with the solar year, met with complete failure. Caesar once and for all abandoned the lunar control previously dominant in the Roman calendar. This bold stroke settled the problem of incommensurability of the lunar month and the solar year and vastly simplified the whole calendar problem. It was done by assigning enough additional days to the existing 12 lunar months to fill out a year of 365 days, and by providing for the intercalation of a leap day (February 29) every four years, Caesar having given the year a value of 365¼ days.

Sixteen centuries later (1582) Pope Gregory XIII replaced Caesar's leap year rule with the more accurate one that we use today under which the leap days of three century years out of four are omitted. Caesar's rule failed to

make allowance for the fact that the solar year is about 11 minutes less than 365¼ days, with the result that the date of the spring equinox had drifted from March 21 to March 11. Gregory dropped ten days from the calendar to correct the error. Because of these changes we make a name distinction between the Julian and Gregorian calendars, but in Gregory's reform as in Caesar's reform the sole problem was to keep the calendar in accurate step with the solar year.

The Modern Calendar Problem.—The calendar problem of the 20th Century is entirely different from that solved by the Gregorian reform. The present problem consists in remedying the irregularities of, and variations in, the internal structure of the calendar. As will be presently set out, there are two major defects, but great confusion is caused in the minds of those who newly approach the question of simplification of the calendar by the voluminous literature discussing in a controversial way a long array of pros and cons in favor of one or the other of the two plans of reform submitted to the world by the League of Nations. In many cases little or no care is taken to discriminate between major and minor considerations.

Every generation making a change in its calendar is put to a serious inconvenience over a considerable period of time during which the effects of transition are experienced. For this reason alone no change should be advocated or considered which does not carry with it substantial advantages to ourselves and definite and lasting benefit to posterity.

On this basis the Committee believes there are only three essential questions to answer, namely:

(1) Are the defects of the present calendar sufficiently serious to justify its change?
(2) What are the possible changes which will most completely remove its major defects?
(3) Should any change which retains major defects be favored even though some minor advantages are secured?

In this report an effort is made to offer a logical presentation of facts which themselves appear to indicate intelligent and rational answers to the foregoing questions.

Defects of the Present Calendar.—As just mentioned, two major defects exist in the structure of the present calendar. One is the fractional relations between the seven-day week and the larger subdivisions of the year, that is, the month, quarters and half years as now used. The months, except for February, consist of four weeks plus two or three days. The quarters, except the second quarter, are one day less or one day more than 13 weeks and the half years are one day less or two days more than 26 weeks.

The second major defect is the incessant cycle of changes year after year in the week-day names of January 1st and in consequence a later change in the day-name of dates throughout the year.

Resulting from these major faults are others: the day-names of dates never correspond in consecutive months of the same year nor in the same months of consecutive years, or to put it in another way, there is a change in the distribu-

tion of the days of the week from one month to the next in the current year and as between the same months in different years. Another is that the position of a given week changes year after year.

All of those defects indisputably cause inconvenience, are a source of confusion and exact a toll of time and effort from our modern civilization. This is especially true with the collection and interpretation of periodic statistical information of all sorts.

A principal difficulty is with the months. For accounting purposes and for business and scientific statistics the months are not accurately comparable unless adjustments are made to allow for the incessant changes in their number of working days, and often for variations in number of individual days of the week having a distinctive value. Some months have five Sundays, others four, or five or four of other days of the week. Comparisons from month to month and between the same months of preceding years are in each case subject to distortion and liable to misinterpretation. Often in the process of accounting, the calendar-caused variations cannot be accurately separated from the other causes of variation. To cite but a few of many examples which might be given:

> The varying number of working days in the month causes an abnormal deflection in the monthly production totals of a factory or in the energy load of a power company. In the former case, if the five-day work week is in use, the difference between two months may be 21 per cent. In the retail trade, in which Saturday is usually a day of heavy business, months with five Saturdays cannot be accurately compared with months having four. In the case of commercial hotels, whose days of best business are Wednesday and Thursday, monthly reports are similarly deflected.
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> In cost reports of any business paying wages weekly, distortion is caused by five weekly payrolls in a month that has to be compared with a month having four.
>
> Monthly indices of the volume of business in different lines, such as are prepared by the Government's Bureau of Foreign and Domestic Commerce, must frequently be weighted to allow for changes each month in the number of individual days of the week that normally have a higher value than the others. Monthly import and export statistics are known frequently to be misleading because the totals are required to be published exactly as they sum without weighting or adjustment for calendar-caused differences.
>
> The collection of vital and health statistics from the reporting agencies and their summation in monthly totals are made troublesome by the varying number of Saturdays and Sundays in the months. Scientific studies of the physical and mental growth of children, of the incidence of epidemics and other phenomena based on the time element must take into account the inequalities in the lengths of the months.
>
> Again there is a constantly varying time relation between weekly and monthly business operations which is an obstacle to their coördination. The exigencies of business require that much statistical data, such as reports of production, sales, orders, shipments, etc., be compiled on a weekly basis. Difficulties are met when it is attempted to summarize these data in monthly

totals owing to the presence of parts of weeks at the beginning or end of a month, or both. The same variation tends to confuse the personal finances of most people. Weekly or monthly income constantly changes with relation to monthly and weekly expenditures. Likewise, scientific data based on both the week and the month, as in meteorology, are difficult to coordinate.

Lack of comparability and incommensurability with the week also applies to the quarters and half years, although the differences are not so great as among the months.

Beside the foregoing disadvantages, periodic events, such as the opening of courts and legislatures, fairs and annual meetings, election and inauguration days never can be fixed with precision by the present calendar. If fixed by a date of the month, the date will in time fall on a Sunday, or if fixed by a day of the week, the date will vary from one to seven days in different years. Notably inconvenient is the variation of the days of the week or dates of the month upon which holidays fall.

Another inconvenience is that calculations of days or weeks between dates of months are too difficult for most people without consulting a printed calendar.

Question I Answered.—The foregoing statements of the defects of the calendar seem to indicate an affirmative answer to the first question to be decided, that is, the defects of the present calendar *are* sufficiently serious to justify its change. This conclusion is in accord with a widespread prevalence in the United States and in the world in general of the conviction that the defects of the calendar should be overcome.

The Movement and Plans for Reform.—For more than a hundred years progressive minds in the greater nations of both Europe and the Americas have called attention to the defects of the calendar and have proposed various forms of revision. The question has been the subject of discussion at meetings of various scientific and commercial bodies here and abroad. It was at length brought to the attention of the League of Nations, which in 1926, after a detailed consideration of nearly two hundred proposals, selected two plans of reform which with certain allowable minor variations, were deemed practicable of universal application. The League suggested that national committees be formed in the various nations to ascertain public opinion on the question of calendar reform and in 1931 reports by such committees, including that of an American committee sanctioned by the Department of State, were considered at an international conference of the League, the United States participating (Fourth General Conference on Communications and Transit). At this Conference the elimination of the faults and inconveniences of the calendar was again favored and a survey of the possibilities of ultimately achieving that object was submitted to the governments for further study. The choice of a plan was left in abeyance.

Each of the two plans proposed is a perpetual calendar, that is, each eliminates the incessant cycling of the day names for January 1 and of all subsequent dates in each year and thus remedies one of the calendar's major defects. This

is done by the intercalation in ordinary years of a day with a non-week day name to take the place of the one day by which the year exceeds 52 weeks. In leap years two such days are intercalated. Here it must be noted that this necessary intercalation of days with non-week day names halts the cycling of the week and consequently interrupts the seventh day sequence of weekly days of rest and worship. Objection to this has been formally raised only by the clergy of the religious sects whose Sabbath coincides with Saturday. Discussion of it would lead into the realm of theology. In any case, the paramount question seems to be the general benefit of a simplified calendar to humanity as a whole.

Types of the two plans worked out in detail by respective advocates are here described:

Type of 13 Equal Months Plan: The year is divided into 13 equal months each of 28 days, or four weeks, with the one or two days beyond its fifty-two weeks not bearing the name of any day of the week. For these the chosen names "Year Day" (every year) and "Leap Day" (in leap years) are proposed. Each year would begin on Sunday perpetually and each month would begin on Sunday and end on Saturday perpetually. Each quarter has 13 weeks. The names of the present 12 months are retained. The additional month is placed between June and July. The name "Sol" (Solstice) for this month is proposed. "Year Day" is the last day of the year and is dated December 29. It would be observed as a holiday. The quadrennial "Leap Day" is put at the end of June and given the date of June 29. The advocates of this plan propose that a table for the conversion of dates from the present calendar to the revised calendar be legally enacted.

Type of 12 Months Equal Quarters Plan: The year is divided into equal quarters of 91 days, the first month in each quarter having 31 days and the second and third months 30 days each. Each quarter has 13 weeks. The one or two days beyond 52 weeks bear non-week day names, similarly as in the 13 equal months plan. The chosen names of "Year Day" and "Leap Day" are proposed. Each quarter of the year would begin on Sunday and end on Saturday perpetually. "Year Day" follows December 30, is considered as an extra Saturday and is tabulated as December *Y*. "Leap Day" follows June 30 in leap years, is considered as another extra Saturday and is tabulated as June *L*. A table for conversion of dates is also proposed.

The Plans Compared.—It is scarcely necessary to say that a perfect internal arrangement of any calendar is quite impossible. We cannot change the length of the day or of the calendar year. At the present time the length of the year stated to five decimal places is 365.24220 days, a number quite incommensurate with even a single calendar day. While history seems to show that man himself introduced the seven-day week as a calendar unit, nevertheless such a unit seems to be inexorably fixed by vast traditions and cannot be changed even if there were any advantage in doing so. The month then is the only calendar unit whose length can be changed. When stripped of a large number of minor and confusing details the whole question of simplifying the internal structure of the calendar resolves itself into the one question, "What is the best length of the month?"

One plan consists of identical months of exactly four weeks each throughout. The adoption of a perpetual calendar consisting of identical four-week months would almost wholly remove the difficulties of statistical compilation and liability to misinterpretation which arise under the present calendar. Weekly data could be exactly summed into monthly data and months would be comparable with one another both in the same year and in different years. Moreover, the general inconvenience resulting from the incessant change of day names and dates from one month to the next, as well as between the same months of consecutive years, would disappear completely. Printed calendars could be dispensed with.

The other plan introduces unequal months of 31 and 30 days, that is, some months with four weeks plus three days and others with four weeks plus two days. Each succeeding month would contain a different distribution of days of the week, one with five Saturdays, Sundays or other days, the next with four. The difficulties of statistical summation of weekly data into monthly data and of comparison of monthly data from month to month would be perpetuated. In addition, the days of the week in consecutive months would fall on different dates even though in fixed sequence. Three arrangements of monthly dates would have to be remembered. Clearly it fails to correct one of the major defects of the calendar.

What real advantages does the equal quarters plan offer? It is made a perpetual calendar by the use of "Year Day" and "Leap Day." Solely because of this, it has the advantage that, regardless of how the months differ among themselves, corresponding months in consecutive years are alike and therefore comparable. This is an important advantage, but it is pointed out that this same advantage is also a feature of the identical four-week months plan. Moreover, the introduction of "Year Day" and "Leap Day" into the present calendar without other change would accomplish the same result. In other words the comparability of monthly or other periods of statistical data in consecutive years is an advantage of any perpetual calendar and not of the equal quarters plan alone.

Therefore, in examining the merits of the equal quarters plan, we are left to discover what would be accomplished by such changes as it makes in the actual structure of the calendar. We find that the changes equalize the quarters of the year in balanced groups of 31, 30 and 30 day months, each quarter having 91 days or 13 weeks. There being five Sundays in the 31 day months, each month would have 26 working days, but it is pointed out that this advantage becomes negative where the five-day working week is used, also in those businesses in which certain week-days have a high business value, such as Saturdays in the retail trade. The difference between this arrangement and the present calendar is very slight. The quarters are already nearly equal having 90, 91, 92 and 92 days. Here the question arises as to whether the equalization of quarters of the year that are already nearly equal is sufficiently important to justify the inconvenience of change.

Turning again to the 13 four-week month plan, were it true that the month were the primary or solely important unit of the calendar, serious objection

might well be sustained against the introduction of a year of 13 months. In terms of its months such a year cannot be divided into quarters and half years without dividing months into one, two or three week fractions. Monthly data cannot be exactly summed into quarterly or semi-annual data as in the case of quarterly and semi-annual financial statements summed from monthly reports. But unquestionably in industrial, commercial and scientific statistics, more monthly data are derived from weekly data than quarterly data from monthly data. In other words, the fractional relations of the week to the month in the present calendar is on the whole more serious than would be the fractional relation of the month to the quarter in a 13 months calendar. It is impossible in the same calendar to have a year that can be quartered into months and months that can be quartered into weeks. A choice is inevitable, and because of the more frequent compilation of weekly data into monthly data the weight of advantage seems to be preponderantly in having months that can be quartered into weeks.

Again, in the case of the 13 month proposal, it is recognized that in certain fields of business activity making little use of the week as a time unit, such as public utilities and transportation, the introduction of an additional month would entail an increased accounting expense that might not soon be compensated by the advantages of change.

A Criterion.—The advocates of the two plans are prone to set out a long array of the advantages of their own calendar and the faults and defects of the plan of their opponents. In the opinion of the Committee by far the greater part of this is minor and inconsequential matter. Up to this point this report has concentrated the discussion upon what the Committee considers to be the important differences. This having been done, it seems proper to offer a criterion by means of which conclusions can be formed and an answer given to the second question, which we here repeat: What are the changes which will remove the calendar's two major defects, (1) the fractional relations of the week to the other subdivisions of the year and (2) the cycling of the days of the week to different dates from year to year.

From the standpoint of statistics it can scarcely be questioned that the week has in modern times become a basic and highly important unit. The month and the quarter are also important, but as has already been pointed out, monthly data are frequently derived from the summation of weeks necessitating the use of an estimate or formula of adjustment to take care of the fractions of weeks. This is very largely the case in manufacturing and merchandising. For many statistical reports the week alone as the constant sum of seven days is the only unit used. The month alone and especially the quarter are too long for a great number of studies like the growth and progress of staple crops, changes of temperature and weather and for a great deal of financial, industrial and commercial data subject to rapid variation. In evidence of this the many series of institutional and government statistics compiled on the weekly basis and the use of the week for many kinds of private business data need hardly be mentioned to statisticians.

In other words, the week, as well as the month and the quarter, is now a much

utilized statistical time unit and obviously the important needs and practices above mentioned clearly indicate that each of the longer units, but especially the month, should be an exact multiple of the week. With this in mind, the following table accompanied by the formula which makes the calendar "perpetual" offers the only possible criterion by which both major defects of the present calendar can be overcome.

1 week = 7 days
2 weeks = a fortnight—14 days
4 weeks = one month—2 fortnights—28 days
13 weeks = one quarter year as nearly as nature permits—91 days
26 weeks = one half year as nearly as nature permits—182 days
52 weeks = 13 months exactly—one solar year less 1.24220 days

The extra whole day must be taken up in the calendar by the intercalation each year of a holiday with a non-week day name which must be chosen. The fractional part of the excess must be intercalated as an additional holiday in leap years also bearing a non-week day name such as "Leap Day."

Comparing the two plans with this model, both are perpetual calendars, but with respect to their internal structure, clearly the plan based on identical four-week months with quarters of 13 weeks, completely satisfies the model whereas the equal quarters plan has fractional weeks in every month and fails to satisfy the model. It seems, indeed, that anyone with even limited experience in conducting work and studies involving the collection and analysis of periodic information must be impressed with the flexibility and advantages attendant upon the use of a calendar in which the subdivisions stand in the simple relations of the model in which all parts are exact multiples of the week.

In the equal quarters plan only the quarters and half years are multiples of weeks, so that the foregoing contrast seems to answer not only Question 2 but Question 3—Should any change which retains major defects be favored even though minor advantages should be secured?

The Four-Week Statistical Period.—Finally, the Committee cannot overlook the importance of the fact that a more or less spontaneous trend toward reckoning by four-week intervals is already well under way, with notable development during the present year. This is that statisticians and accountants, in an effort to escape the difficulties in presenting accurately comparable reports on the basis of the calendar month and in coördinating weekly and monthly statistical information, have introduced to the business world the four-week statistical or accounting "month," 13 to the year, commonly known as "The 13 Month Business Calendar."

Notably since the beginning of the depression this business calendar has been adopted by an increasing number of business houses as a basis not only for comparable periodic reports of production, sales, orders, shipments, etc., but for cost accounting and budgeting, for profit and loss accounts and for complete financial statements covering groups of four-week periods. The change has involved the inconvenience of adjustment and in most cases, more or less expense. Conversion of the previous year's statistics to the four-weeks basis

has usually been sufficient. The use of such auxiliary calendars is rapidly increasing in spite of the inconvenience caused by the present incessant cycling of the week-day names of January 1.

Again in the field of public health and medical investigation, statisticians have also introduced the four-week period to escape the difficulties of compilation and interpretation on the basis of the present calendar month.

The Four-Week Period Under the NRA.—Still more notable are the recent developments in the use of the four-week period in connection with National Recovery. The National Recovery Administration requires the organization of a statistical information service by each industry under its Code of Fair Competition. In each case, the Code Authority presiding over the industry is charged with collecting from each member statistical reports on wages, hours of labor, number of employees, production, shipments, sales, etc. This information not only is required for use in the enforcement of each Code, but it is contemplated that it will provide the NRA and the existing government statistical agencies with information about industry as a whole, as a basis for economic planning. The program envisages, for example, the correlation of employment data with production data, of costs with prices and the creation of new indices to determine economic trends.

Almost at the outset of the government's still developing program, the difficulties presented to its statisticians in collecting and analyzing information involving weekly and monthly periods caused your Committee to be called to Washington to consider these difficulties and make a recommendation. The immediate case in point was a proposed questionnaire to be distributed by the Bureau of Labor Statistics calling for monthly payroll data and hours of labor. Because of the different practices of different firms in the payment of wages, there were involved five different payroll periods; weekly, fortnightly, semi-monthly, every four weeks and monthly. Obviously for the interpretation of these five classes of returns, the necessary task of coördinating them with the calendar month would be very difficult. The difficulty is, of course, that the month is not a multiple of the week. Further it appeared that it was desirable to correlate these returns with production data, which would raise further difficulties because in industry production data are compiled by different periods, some weekly, some every four weeks and some monthly. Your Committee unanimously adopted a recommendation directed to the Central Statistical Board of the Government which it is pertinent to quote:

> Resolved that it is recommended that the current statistics of industry and trade relating to employment, payroll, production and other data used to measure the volume of business activity should be reported for periods of one week, two weeks, or four weeks, with the object of making possible comparisons on a four-week basis, it being understood that in the case of certain industries or fields of activity exceptions to this practice may be appropriate.

At the time this recommendation was presented, several industries had already provided in their codes for collecting their statistics on the four-week basis. Although the consideration given to the recommendation has not yet been publicly disclosed, trade associations and Code Authorities shortly afterward received from the Division of Economic Research and Planning of the NRA

sets of forms for reporting statistical information every four weeks with a suggestion that "if all industry would go on the 13 month basis with four weeks in each fiscal period, it would greatly simplify all statistical reporting and accounting."

Summary and Conclusions.—Epitomizing the facts and explanations that have been presented, we find that the week has become in modern times a highly important unit for the summarization of statistical data. Having in mind the two major defects of the present calendar, the principal features of the two plans of reform presented by the League of Nations have been described and compared. A model arrangement of a perpetual calendar based on the week as the prime unit of which all the other subdivisions are exact multiples has been presented and shown to be the only one which will remedy both the major defects. It has been shown that the proposed reform based on identical four-week months completely satisfies the model, and that the one in which 12 months are arranged in equal quarters removes only one of the major defects and retains the other.

The Committee recognizes that the achievement of any reform of the calendar is a task beset with various difficulties. Two views may be taken. The short range view considers the immediate difficulties of transition, changes of habit, shifts in birthdays and familiar anniversary dates, breaks in statistical series, cost of adjustment and how soon and to what extent any increased expense will be compensated by the advantages of change. These and other objections seem, indeed, real to the present generation.

On the other hand, the long range view regards the ultimate advantages of a perfected calendar to the whole world and to posterity. It considers that, as in the case of the calendar changes that have been made in the past, although the temporary disturbance has to be endured, humanity will be forever benefited by the change. This was the case in the change from the Julian to the Gregorian calendar which was slowly accomplished, nation by nation, at different times, involving the omission of 10, 11 or 13 days from the current year.

The Committee feels that the immediate difficulties are a minor consideration compared with the ultimate benefit to humanity which a simplification of the calendar would confer. Its conclusions are:

I. That the elimination of the two major defects of the calendar
   (1) The fractional relations of the week to the other subdivisions of the year, and
   (2) The incessant cycling of the day of January 1 and consequently of the day names of all other dates in the year

should be favored by the American Statistical Association.

II. That to accomplish this
   (1) The year should be divided into equal subdivisions of months of exactly four weeks, of quarters of exactly 13 weeks and half years of exactly 26 weeks, and
   (2) The one or two days in each year in excess of exactly 52 seven-day weeks should bear non-week day names.

III. That unless a plan of calendar reform comprises subdivisions of the

year all of which are whole multiples of the week, no change in the present calendar should be made.

The Committee believes that if the above conclusions were adopted by the American Statistical Association at this time, it would serve to clarify confusion and clear the path to a proper reform.

M. B. FOLSOM, *Chairman*

MINORITY REPORT

The undersigned vigorously dissents from the majority report of the Committee on Calendar Reform as prepared for submission to the Board of Directors of the American Statistical Association, particularly with respect to the conclusions stated in that report, on the following grounds:

1. I believe that the subject of calendar reform is of such importance to all statisticians that any recommendations of a committee of the Association on the subject should reflect the views and conclusions of a majority of the membership of the Association. No effort has been made by the Committee to obtain the views of the membership of the Association.

2. The majority report recommends a particular proposal for calendar reform and hence may be interpreted, and publicly cited, as constituting an endorsement of this proposal by a majority of the statistical profession, despite the fact that there is no evidence to show that the recommendation reflects the views of a majority of the membership of the Association.

3. I do not agree with the conclusion of the majority report that unless the particular plan of calendar reform recommended—a plan comprising subdivisions of the year all of which are whole multiples of the week—be adopted, no change in the present calendar should be made. From a statistical point of view I believe that most of the defects of the present calendar can be remedied by a plan of reform which introduces a fixed or perpetual calendar but which may not necessarily be identical with the particular plan advanced as the sole recommendation of the majority report. In expressing this belief, I am not advocating any particular proposal for calendar reform.

4. I do not agree that it is essential to a desirable plan for calendar reform that the month should be a multiple of the week. Incidentally, owing to the factor of seasonal variation which affects almost all series of statistical data, data relating to subdivisions of the year cannot be made comparable within any year merely by providing that these subdivisions shall be of equal length—a fact which, in my opinion, is inadequately stressed in the majority report.

5. I agree that the week is an important time unit and that many series of statistical data should be recorded by weeks. But this can be done under any form of calendar which provides such a time unit. I fail to see that the practice, where employed, of summarizing data for periods representing multiples of the week (e.g. for periods of four weeks) is of significance in the consideration of calendar reform.

6. I attach more importance than does the majority report to the advantages of a plan for calendar reform which provides that quarterly and semi-annual periods shall be multiples of the month.

Fortunately or unfortunately, I do not have time to set forth the reason for my dissent at greater length prior to the date scheduled for filing the Committee's report.

SEYMOUR L. ANDREW

Report of the Committee on Census Enumeration Areas

The purpose of this Committee last year was to develop the use of census tract data through the exchange of ideas and experiences of those persons promoting its use in the various census tract cities.

This year, the added purpose is the further development of the technique of handling such data and the extension of the census tract idea to an additional number of large American Cities.

It was recommended last year that consideration be given to the magnitude of the population base required for each of the various types of data collected by census tracts and the reliability of rates. A joint session of the American Statistical Association and the American Sociological Society was held Friday, December 29, for the consideration of this subject.

Chairman: C. E. Gehlke, Western Reserve University

Topic: The Use of Census Tracts

Papers: Reliability of Rates in Census Tract Materials, Robert E. Chaddock, Columbia University

Sampling Errors and Interpretations of Social Data Ordered in Space and Time, Frederick F. Stephan, Council of Social Agencies, Pittsburgh

Some Problems in the Correlation of Spatially Distributed Variables, Jerry A. Neprash, Franklin and Marshall College

Correlation Coefficients in Census Tract Materials, C. E. Gehlke and Katherine Biehl, Western Reserve University

The Committee favors:

(1) Emphasizing the importance of family data in all future population censuses.

(2) The enumeration of the current Census of American Business in such a manner that the data will be readily available by census tracts in the census tract cities.

(3) Census taking projects financed through CWA should be required to use forms and instructions approved by the Central Statistical Board whenever feasible.

The Committee is encouraging key persons in large cities to get their city laid out in census tracts so that any future census may be taken by such areas.

A morning meeting and luncheon session was held by the Committee and invited guests on Wednesday, December 27, in Philadelphia.

ROBERT E. CHADDOCK
GEORGE O. LUNDBERG
R. D. MCKENZIE
HARRY A. WEMBRIDGE
HOWARD GREEN, *Chairman*

Report of Representatives on the Advisory Committee on the Census

The Joint Census Advisory Committee of the American Statistical Association and the American Economic Association held two meetings during 1933, one on March 17 and 18 and the other on September 22 and 23.

The recommendations made by the Committee at the March meeting were in substance as follows:

That there be no Statistical Atlas published in connection with the Fifteenth Census.

That there be no publication at this time of a volume corresponding to the volume, *Mortality Rates, 1910–20;* but that a committee be appointed to consider the form and contents of a possible substitute for that volume, and that Professor Chaddock be designated as representative of the Advisory Committee on any committee constituted by the Director for that purpose.

That new life tables be prepared on the basis of the 1930 census.

That the decennial inquiry regarding taxation, public indebtedness, revenue, and expenditures be published under the title of *Financial Statistics of State and Local Governments* instead of *Wealth, Public Debt and Taxation;* and that no estimate of the total national wealth be included in that inquiry. Without specifically recommending that the inquiry, like that of 1922, include a Digest of State Tax Laws the Committee expressed the opinion that the inclusion of such a digest would add materially to the value of the report.

The Committee passed the following resolution in favor of having a mid-decennial census of population:

> WHEREAS there have been extensive and unusual movements of population from one area in the United States to another since the 1930 census, and very great changes in the rate of population increase by reason of the cessation of immigration and the decline in the birthrate, so that it is no longer possible to make the usual annual estimates of population for states and cities with any satisfactory degree of accuracy, and
>
> WHEREAS it is essential to know the number of persons living in the various states, cities, and counties year by year, in order that reasonably accurate rates may be computed for births, deaths, and morbidity, and for financial items such as governmental expenditures; in order that proper provision may be made for the expansion of public utility services; and for other reasons,
>
> BE IT RESOLVED that a simple mid-decennial census of population should be taken either late in 1934 or early in 1935, this census of population to be limited to basic items, like sex, color or race, age, marital condition, and urban, rural, or farm residence.

At its September meeting the Committee was called upon to consider mainly the printing situation in the Census Bureau, the plans for the 1933 Census of Manufactures, and certain problems which had arisen in relation to the compilation of vital statistics.

Because of a cut in its printing allotment, the Bureau of the Census had been compelled to suspend the printing of the Fifteenth Census Reports and either to omit certain of the annual publications or to combine two years in one report. In view of this situation the Committee passed the following resolution:

> RESOLVED that the Census Advisory Committee is greatly concerned to learn that owing to the fact that the funds allotted for printing are about 50 per cent below the amount asked for and as estimated as necessary, the Bureau has been

compelled to abandon or postpone indefinitely the printing of some of the reports which will be completed ready for publication in the current fiscal year and to curtail very materially the scope and detail of others. It is obvious that in so far as the statistics which the Bureau compiles and tabulates can not be printed, the money expended on their collection is wasted. Either the Bureau should be provided with funds sufficient to print the results of the statistical compilations which it is authorized or directed by law to make, or else the scope of such compilations should be reduced to come within the limits imposed by the funds that will be available for printing the results.

The Committee therefore recommends that steps be taken, to secure, if possible, supplementary funds for printing the current reports; and looking to the future that an organized effort be made to do away with the present practice of making a separate appropriation for printing as applied to the work of the Census Bureau and to include the cost of printing in the appropriation granted directly to the Bureau for carrying on the statistical inquiries which it may be authorized or directed by law to make.

Since the above resolution was passed by the Committee, funds for completing the printing of the Fifteenth Census Reports have been supplied by the Civil Works Administration. But the funds available for printing of current reports are still quite inadequate.

As regards the vital statistics work the immediate and most urgent question was that of allowing the New York State Health Office to supply the Census Bureau with punched cards for the transcription of mortality data in place of handwritten transcripts. After consideration of this and other questions relating to the compilation of vital statistics the Committee passed the following resolution:

RESOLVED: 1. That provisionally and as an experiment, arrangements be made with the New York State Health Office authorizing the use of punched cards for transcribing death data, provided this method of transcription is permissible under the existing law.

2. That Dr. Chaddock be requested to serve as a Committee of One to make a preliminary study of all phases of the present situation regarding the collection of vital statistics and report to the Advisory Committee at as early a date as possible.

As regards the plans for 1933 Census of Manufactures, the Committee was called upon to consider especially the situation which existed as a result of the cut in the appropriation for field work, which would make necessary a considerable curtailment in the scope and detail of that census as compared with prior censuses. The Committee passed the following resolution:

RESOLVED that it is highly desirable that the Census of Manufactures be taken for 1933 and that the information should be properly comparable with that of previous censuses. The Committee finds that it will be impossible to attain this result unless additional funds are made available for necessary field work in connection with this census. The Committee therefore strongly recommends that appropriate measures be taken to secure the restoration to the Bureau of the Census for this purpose of $115,000.

The Bureau has now been informally assured that additional funds for the field work of the Census of Manufactures to the amount of $115,000 will be supplied from the budget, thus making it possible to conduct a field canvass which will secure information properly comparable with that of previous cen-

suses, although the amount of production detail on the special schedules will be materially reduced.

EDMUND E. DAY, *Chairman*
Representatives of the American Statistical Association:
ROBERT E. CHADDOCK
PAUL T. CHERINGTON
WILLFORD I. KING

Report of the Representative on the Board of Directors of the National Bureau of Economic Research

As the representative of the Association on the Board of Directors of the National Bureau of Economic Research I take pleasure in reporting an active year of operations for that organization along its established lines of undertaking studies and analyses of those elements of economic, social and industrial science which lend themselves, in the main, to quantitative treatment.

A full report of these activities will be made by the Directors of Research of the Bureau in February of the coming year.

Publications of the Bureau which will be of special interest to statisticians are Dr. Kuznets' *Seasonal Variations in Industry and Trade* (recently issued) together with Arthur F. Burn's *Production Trends in the United States Since 1870*, and Professor J. M. Clark's *Strategic Factors in Business Cycles*, both of which are now ready for the press. Further publications now substantially completed are Dr. Carl Schmidt's *German Business Cycles*, Professor Ralph Epstein's *Industrial Profits* and Professor Harry Jerome's *Mechanization in Industry*.

The Bureau has recently announced the addition of Professor Eugen Altschul, formerly Director of the Frankfurter Gesellschaft fur Konjunkturforschung as an associate staff member.

An item of special interest is the decision of the Bureau to grant a discount of 25 per cent from the list price of its publications to members of the American Statistical and American Economic Associations.

Your representative, with other Directors of the Bureau, has continued that critical review of advance texts which has contributed to invest the publications of the Bureau with an authoritative usefulness in problems of economic statistics.

M. C. RORTY

Report of Representatives on the Joint Committee on the Encyclopaedia of the Social Sciences

Your representatives submit as their report the following "Annual Report, Encyclopaedia of the Social Sciences, Inc.," by the Editor-in-Chief, Edwin R. A. Seligman.

> It is with the greatest satisfaction that the editor-in-chief of the Encyclopaedia of the Social Sciences is able to report that the completion of the enterprise is now assured. After many protracted conferences with our supporters, and

especially the Rockefeller Foundation and the Carnegie Corporation, we were able to secure a grant of funds which, with a great deal of sacrifice on the part of our editorial and office force, will ensure the completion of the work.

Volume 12 will appear in the near future and the remaining three volumes are sufficiently advanced to permit of the confident expectation that they will be published at approximately three month intervals. All of the articles for the three final volumes have been assigned. The comprehensive index is well under way.

Next year when the final report is presented, full figures will be given, but it is worth while to emphasize even now that although the enterprise will have cost almost double of the original estimate of $650,000, the character of the work and the punctuality with which we have fulfilled all our promises have been able to secure for us the liberal and continued support of our benefactors.

ROBERT H. COATS
ROBERT M. WOODBURY

Report of Representatives on the Social Science Research Council

There are four items in the activity of the Social Science Research Council during 1933 that are of particular interest to members of the American Statistical Association:

1. Provision has been made for aid to the Bureau of the Census in segregating materials for preservation and for distribution. Dr. Warren S. Thompson has done the work in conjunction with the Council's Committee on Social Statistics.
2. Provision has been made for financial support of the work of the Census Advisory Committee.
3. At the request of the Director of the Census, the Committee on Social Statistics has undertaken to examine the broader aspects of the government's handling of vital statistics.
4. The Committee on Government Statistics and Information Services, a joint committee of the American Statistical Association and the Social Science Research Council, has been amply financed for effective work during the period of a year. This Committee has been very actively at work in Washington for the past six months. Great competence has been shown in establishing and maintaining highly satisfactory relations with the responsible officials of the government. The work of the Committee will redound to the credit of the Association and of the Council. That result has already been substantially accomplished; and its essential basis is the wisdom of the Committee in making no claims to credit for itself or its parent bodies, but rather in guiding all credit to the officials who take the responsibility for making its recommendations effective.

EDGAR SYDENSTRICKER, *Chairman*

Report of the Representative on the Board of the Business Research Council, Incorporated

Subsequent to the publication, in 1932, of the results of its first census of economic and business research in American Colleges and Universities, the Coun-

cil has been inactive. While conditions are not yet favorable to the adoption of an active program, members of the Council believe that the corporation should be continued with a view to further usefulness as soon as the economic situation is somewhat more clarified.

The Secretary-Treasurer of the Council, Donald R. Belcher, requests that his appointment as representative of the American Statistical Association be extended for the year 1934.

DONALD R. BELCHER

Report of Representatives on Committee Appointed to Advise the New York State Department of Social Welfare

On this Committee, appointed by the Committee on Social Statistics of the Social Science Research Council to assist the Division of Research of the New York State Department of Social Welfare in a special project designed to improve the welfare statistics of that state, the Association has been represented during this year by two members, Horatio M. Pollock and Ralph G. Hurlin. We are able to report satisfying progress of this project. Additional funds were granted by a foundation to assist the work for a second year. The State Board of Social Welfare has raised the status of the research office of the Department from a Bureau to a Division, thus indicating its materially increased importance. The Division has now a staff of 31 workers, of whom 11 are on permanent status.

Monthly state-wide statistical reporting systems are now in operation representing nine fields of welfare activity. Improvements are being made in the annual statistics reported by some 2,000 welfare institutions and agencies. Several special studies are being conducted in connection with plans for improving the quality of these statistics. The most important of these, a study of the statistics of children in foster care, has been carried on, at the request of the Advisory Committee, by the Committee on Child Care and Relief of this Association and this Committee is now coöperating further by experimental study of an appraisal form for child welfare activities.

RALPH G. HURLIN

Report of the Representative on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing

This Committee has continued to serve as a clearing house of information bearing upon the application of statistical methods in engineering. It has cooperated with committees organized for the same purpose in England and Germany in 1932. Members of the Committee have acted in an advisory capacity to many different engineering committees in America, with the result that considerable progress has been made in extending the applications of modern statistical theory in the field of engineering and production. The program for 1934 calls for continued activity along these lines.

W. A. SHEWHART, *Chairman*

COMMITTEES FOR 1934[1]

Research Committees

Committee to Stimulate and Coördinate Research

Meredith B. Givens, *Chairman*
Burton H. Camp
Morris A. Copeland
Neva R. Deardorff
Horatio M. Pollock
Mary van Kleeck
W. Leonard Crum

Committee on Government Statistics and Information Services

Edmund E. Day, *Chairman*
Donald R. Belcher
Robert E. Chaddock
Meredith B. Givens
Frederick C. Mills
Bryce M. Stewart
Morris A. Copeland

Advisory Committee to the Secretary of Labor

Bryce M. Stewart, *Chairman*
Ewan Clague
Morris A. Copeland
J. Frederic Dewhurst
Meredith B. Givens
Ralph G. Hurlin
Aryness Joy
Murray W. Latimer
Howard B. Myers
Sidney W. Wilcox

Committee on Statistics of Institutions for Mental and Physical Disorders

Horatio M. Pollock, *Chairman*
G. W. Baehne
Kate H. Claghorn
Emil Frankel
Carl McCombs
David M. Schneider

Committee on Statistics of Relief and Child Care

Neva R. Deardorff, *Chairman*
F. Stuart Chapin
Ewan Clague
Emil Frankel
Ralph Hurlin
Maurice J. Karpf
Philip Klein
David M. Schneider
Maude E. Stearns
Frederick F. Stephan
Emma Winslow
Helen Witmer

Committee to Inquire into the Question of Calendar Reform

Simon Kuznets, *Chairman*
J. V. DePorte
M. B. Folsom
J. F. Hellweg
Julius Parmelee
Alexis Sommaripa
H. Parker Willis

Committee on Census Enumeration Areas

Howard W. Green, *Chairman*
Robert E. Chaddock
Neva R. Deardorff
R. D. McKenzie
E. A. Stephen

[1] For additional Committee appointments see Miscellaneous Notes in current issues of the Journal of the American Statistical Association.

Committee on Statistics of Delinquents and Criminals

Thorsten Sellin, *Chairman* — Leon C. Marshall
G. E. Gehlke — Edwin H. Sutherland

OTHER COMMITTEES AND REPRESENTATIVES

Committee on Fellows

Seymour L. Andrews, *Chairman*.....Term expires December 31, 1934
Irving Fisher..... " " " " 1935
William L. Crum..... " " " " 1936
William F. Ogburn..... " " " " 1937
Emanuel A. Goldenweiser..... " " " " 1938

Committee on Nominations

Stuart A. Rice, *Chairman* — Alvin Hansen
F. Leslie Hayford

Committee on Special Publications

Frank A. Ross, *Chairman* — Meredith B. Givens

Committee Appointed to Consider the Problems and Principles of Business Statistics and the Relation of the American Statistical Association to the Field of Business Statistics

Theodore Brown, *Chairman* — J. F. Carroll
Donald R. Belcher — F. Leslie Hayford

Committee to Arrange for a Meeting of the International Statistical Institute in the United States in 1939

Walter F. Willcox, *Chairman* — E. Dana Durand
Haven Emerson
(President and Secretary *ex officio* members)

Committee on Finance

Willford I. King — Dean Langmuir
Harold G. Parker

Representative on the Board of Directors of the National Bureau of Economic Research

Malcolm C. Rorty

Joint Committee on the Encyclopaedia of the Social Sciences

Robert H. Coats, *Chairman* — Mary van Kleeck

Representative on the Board of Directors of the Encyclopaedia of the Social Sciences

Wesley C. Mitchell

Representatives on the Advisory Committee on the Census

Robert E. Chaddock, *Chairman*.....Term expires December 31, 1935
Paul T. Cherington..... " " " " 1934
Willford I. King..... " " " " 1936

Members of the Social Science Research Council

Edgar Sydenstricker, *Chairman*.....Term expires December 31, 1934
William A. Berridge..... " " " " 1935
Seymour L. Andrew..... " " " " 1936

Representative on the Council of the American Association for the Advancement of Science

William F. Ogburn

Representative on the Business Research Council

Donald R. Belcher

Representatives on the Committee to Advise the New York State Department of Social Welfare

Ralph G. Hurlin Horatio M. Pollock

Representative on the National Conference on Nomenclature of Disease

George H. Van Buren

Representative on the Joint Committee for the Development of Statistical Applications in Engineering and Manufacturing

Walter A. Shewhart